

# QwikConnect

GLEN AIR ■ APRIL 2011 ■ VOLUME 15 ■ NUMBER 2



## CONNECTOR REFERENCE GUIDE



# WELCOME INTERCONNECT PROFESSIONALS!

**H**igh performance MS type electrical connectors have been around since the late '30s. As military and aerospace electronics became more prevalent and sophisticated, so did the requirements for interconnection devices. As you may know, Glenair is the largest connector accessory supplier in the world building the widest range of backshells, dustcaps, and other accessories for connectors past and present. And in case you haven't noticed, may we point out, in addition backshells, Glenair can now deliver a broad range of connector solutions, from MIL-DTL-38999 to various forms of MIL-DTL-5015 and other high-performance connector solutions.

In this special edition of *QwikConnect*—which we think you'll agree belongs in your permanent reference library—we are happy to provide you with some of the most essential information for use in identifying and specifying MS type connectors and accessories.

## Environmental Connector Types:

### Free Cable Plugs and Mounted Receptacles

Environmental cable plugs and receptacles are “bread and butter” products in the high-reliability I/O connector industry. Regardless of product series, Glenair is able to supply both military standard, VG qualified as well as custom-designed special purpose plug-and-receptacle connectors. The products are typically produced from aluminum alloy, composite plastic, stainless steel, or, occasionally, titanium. Insert arrangements include standard signal as well as power and RF layouts. Coupling styles run the complete range from bayonet to push-pull lanyard release or standard threaded designs.



### Bulkhead Feed-Throughs

Bulkhead Feed-Throughs eliminate the need to permanently fix cable harnesses to panels—affording increased system flexibility, superior mechanical integrity, and greater serviceability. Glenair hermetic and environmental bulkhead feed-through connectors are available in MIL-DTL-38999 Series I, II, III and IV configurations. Hermetic Versions are ideally suited for high-pressure/low-leakage applications in air, sea and space environments, meeting a leak rate of  $1 \times 10^{-7}$  cm<sup>3</sup> per second. Environmental versions offer IP67 level sealing.



### Sav-Con® Connector Savers

Glenair Sav-Con® Connector Savers protect connectors subject to repeated mating and unmating cycles. Sav-Con® Connector Savers prevent costly repair or replacement of expensive connectors and cables while preserving the quality and integrity of connector performance. Sav-Con® Connector Savers take the abuse of repeated connection cycles instead of “black box” or other equipment connectors. Equipment connectors that are mated and unmated frequently during manufacturing, check-out phases and environmental test programs can be protected by Glenair Sav-Con® Connector Savers at considerable savings in time and money.





## Series 80 “Mighty Mouse” Connectors

The Series 80 “Mighty Mouse” Connector is currently available with 45 high density insert arrangements from 1 to 130 contacts on 0.076” spacing, in bayonet, triple-start threaded and push-pull coupling styles. The connector series is broadly applied in ground soldier ensembles—including Land Warrior—and offers virtually equal performance to MIL-DTL-38999 interconnects with up to 71% weight and 52% size savings. The Series 80 “Mighty Mouse” supports a flexible range of contact types, including #23 and #20 signal contacts, #16 and #12 power contacts, size #16 and #12 coaxial and twinax contacts, as well as #12 pneumatic contacts. Fiber Optic termini? Yes, those too.



## MIL-DTL-38999 Type Environmental Connectors

Environmental class plugs and receptacles are offered in high-density insert arrangements (up to 128 contacts) with crimp removable contacts, PC tails, and solder cups—in Series I, II, III and IV configurations. Glenair manufactures a wide range of environmental class MIL-DTL-38999 type connectors including lanyard-release products, composites, specialty metal cable plugs and receptacles, and coax, twinax and quadrax contact equipped products. Both MIL-qualified and one-off “specials” are available to meet the requirements of every application.



## Series ITS Reverse Bayonet MIL-DTL-5015 Type

The Glenair ITS connector series is based on the MIL-DTL-5015 standard, but in lieu of threads, features an improved reverse bayonet coupling that provides positive mating and excellent shock and vibration resistance. These rugged connectors are available in hundreds of power and signal insert arrangements, and offer exceptional environmental protection.



## MIL-DTL-83723

The MIL-DTL 83723 Series III Type connector is ideally suited for use on commercial, military, and aerospace interconnect systems that demand high vibration resistance and reliability in a medium-density cylindrical connector. Glenair can supply over 30 insert arrangements, from 2 to 61 contacts. The MIL-DTL-83723 uses Mil-Standard AS39029 crimp contacts as well as solder cups and PC Tail terminations in sizes 12, 16, and 20



## Series IPT and IPT SE (MIL-DTL-26482 Type)

The Glenair Series IPT SE Bayonet-Lock Signal Connector is ideally suited for all general and environmental applications that require a high-performance military type cylindrical connector with crimp-removable contacts. Qualified to VG95328, the bayonet mechanism provides fast and easy coupling, especially when the connector is situated in an awkward or hard to reach location. Glenair also supplies a selection of higher performance hermetic and environmental MIL-DTL-26482 Type connectors under our 230 series product code



## MIL-DTL-28840

The standard connector and backshell series for shipboard use, MIL-DTL-28840 offers high-density insert arrangement and high-shock performance. The MIL-DTL-28840 features RFI/EMI shielding, scoop-proof shells and corrosion resistant materials and finishes. Glenair’s qualified product line is fully tooled and highly available.



# Introduction to MILITARY STANDARD CYLINDRICAL CONNECTORS

The purpose of a connector is easy to describe: connectors bridge gaps between individual pieces of electronic equipment to make assembly, repair and upgrades easier. Instead of struggling with a gordian knot of soldered circuits and spliced wiring, connectors enable technicians to make interconnections with ease and convenience.

Connectors bridge the gap between individual wires to provide contact between two conductive elements of an electronic system. The connection they make enables electrical current (or light waves in the case of fiber optics) to flow from one conductor to the next. Edward's Publishing's indispensable Encyclopedia of Connectors defines the connector thus: *"An electromechanical device which permits two or more circuit elements to be electrically and mechanically separated and reconnected at will without disturbing any other elements of the circuit. A connector performs no circuit function and should have no effect on the electrical performance of the device to which it is attached. If the connectors of a device were eliminated and the corresponding wires joined together, the circuit would not be affected."*

When connectors are used to connect one set



Connector testing is designed to simulate a lifetime of use over a short period of time. Environmental, mechanical and electrical tests are conducted to measure both the reliability of the connector and the system. The number-one criterion of reliability is a change in contact resistance.

of wires to another, they are called wire-to-wire connectors. Wire-to-board connectors connect a wire to a Printed Circuit Board (PCB). And board-to-board connectors directly interconnect PCB's.

Connectors facilitate fabrication and assembly of electronic products by enabling designers to treat each subassembly as a unique, modular unit. Interconnection can then be accomplished at the most convenient time and place in the production process. Connectors also facilitate equipment repair by allowing technicians to quickly and easily replace suspect components. Without opening black box cabinets and without introducing contaminants like solder and flux into the system, technicians can swap out suspect equipment and have a system back on line in a matter of minutes. Connectors also permit upgrades to electronic equipment without major disruptions to the overall system. Connectors give engineers the flexibility to integrate new products and components into existing systems simply by maintaining a consistent connector specification.

While there is great variety in the makeup and design of each type of connector, as a family they generally share a common set of design elements and component parts. In fact, in order to function as a separable interconnect device, a connector must house the following elements:

- **Contact Interface:** a mechanical means of joining the conductive contacts together under normal force
- **Contact Spring Members:** a means of generating the normal force required to maintain the electrical path between conductive contact elements
- **Contact Finish:** a means of protecting the contacts from corrosion, and for optimizing the lubricity and durability of the contact interface
- **Contact Housing:** a means of holding the contacts and spring members in place and maintaining their exact position and alignment. The contact housing also shields the contacts from the operating environment.

Connectors are selected with consideration to electrical, mechanical and environmental requirements. Electrical requirements include wire type and size, contact resistance, transfer impedance and current rating. Mechanical specifications, such as thermal shock, vibration and durability indicate how well a connector will perform under critical stress factors. Environmental requirements include moisture absorption, temperature resistance, corrosion and resistance to electromagnetic interference. Environmentally resistant connectors are required for interconnect systems which are subjected to fluids in combination with vibration, shock, thermal extremes and corrosion.

While the same basic connector design may be used for both signal and/or power distribution, power connectors use contacts designed specifically for the unique requirements of power distribution. This is due to the relatively higher current/voltage requirements of power applications and the temperature rise experienced by power connectors. A disk drive in a personal computer, for example, uses both signal and power connectors. The power connector bridges the circuit that drives the unit. The signal connector carries the digital data. While the signal and power contacts may be combined into a single connector housing, each contact type is uniquely suited for its role in transmitting either signal or power electrical energy.

### ***The Military Standard Connector***

The multi-contact electrical connector used in Air Force, Navy and other high-reliability applications is a critical subassembly within the wiring system. Military connectors find many diversified applications due to severe environments, mobility, and field repairability. The key attribute of such connectors is better reliability when compared to less expensive commercial connectors. The reliability of a system is essentially a measure of the failure rate of its components. Connectors can fail due to plug dependent mechanisms, wear mechanisms or corrosion mechanisms. Total system life, power on-hours (POH) and system on/off cycles (number of times that a product powers on and off) are

important factors determining system reliability. Military standard connectors (and their commercial equivalents) are chosen for their performance and reliability even in the most severe interconnect applications.

***“Power” contacts carry contacts from size 4/0 to 16***  
***“Miniature” contacts from size 12 to 20***  
***“High-density” contacts from size 20 to 22***  
***“Ultraminiature” contacts size 23***  
***“Microminiature” contacts size 24***  
***“Nanominature” contacts size 30***

The military standard connector is made up of two separate component assemblies known as the “plug and receptacle” which intermate to connect wires with pin and socket contacts. Connector families are defined in this high-reliability world by the military detail specifications which spell out the exact requirements for every aspect of the connector’s design and performance. Connector families are distinguished by their coupling mechanisms, physical shape, contact types, environmental classes and termination methodologies.

Plug and receptacle connector pairs are available in various mounting configurations to accommodate different levels of interconnection and different application requirements. The most common configurations are in-line (wire-to-wire) applications, or various bulkhead, chassis and enclosure mountings. In general, connectors are available to accommodate any fixed mounting or in-line requirement.

Circular connectors are selected because of their compact, rugged design and their ability to effectively seal the connector from environmental hazards. Circular connectors may incorporate bayonet couplings, threaded couplings, ball detent couplings (push/pull), and/or breech lock couplings as their mechanism for locking the mated pairs together.



Rectangular connectors are selected to maximize the number of contacts possible in a restricted space. However, rectangulars are not as easily sealed against fluid damage and other environmental hazards. Spring style rack/panel couplings as well as standard jackscrew fasteners are both common coupling styles in rectangular connectors.

Both circulars and rectangulars can accommodate multiple contact types including power or high-voltage contacts, signal contacts, coaxial and triaxial contacts, or fiber-optic termini. High reliability contacts are usually made from gold plated, copper alloy material. Large diameter power contacts and solder type contacts may be either gold or silver plated copper alloy.

Crimp style contacts are preferred for all aerospace and other high-reliability applications (except those requiring a hermetic seal) due to their relative ease of assembly and maintenance. Solder type contacts are usually selected when cost is the primary consideration and repairability secondary. Solder type contacts are also used in hermetic connectors.

Installation of both crimp and solder type contact connectors requires unobstructed working room behind the connector. Rear release crimp contacts require additional working room to install the extraction tool to remove the contact. Another important design feature of crimp type contact connectors is the connector insert wire sealing grommet. The grommet provides moisture sealing around each individual wire.

The shell of a circular connector is a cylinder available in incremental sizes starting as small as .375" diameter up to 3.25" diameter and larger. The most common shell sizes are available in .0625" increments starting at shell size 8 (.50") to shell size 36 (2.25"). Shell size may be determined by multiplying the shell size number by .0625. Shell size 24, for example, has a 1.50" outside diameter (24 x .0625" = 1.50"). This nomenclature becomes significant, as backshells (accessories which attach onto the connector shell) must inter mate with the connector shell rear-end geometry. Connector and accessory manufacturers both use the term "shell size" to designate the size of their respective products.

## ***Making Sense of Connector Part Numbers***

Military standard connectors are organized under specification series numbers: MIL-C-5015, MIL-DTL-38999 and so on. The specification series number identifies the master document which explains everything about the particular connector family. The actual part numbers of connector components are designed to call out the physical connector type and its dimensional attributes. For example, a MIL-C-5015 receptacle connector designed to be mounted on a box would have a part number such as MS3402DS28-21PY. The number can be dissected as follows:

### ***The first 4 digits after the MS (Military Standard) designate the physical connector type, like so:***

- 3400 - Wall mounted receptacle
- 3401 - In line receptacle
- 3402 - Box mount receptacle
- 3404 - Jam nut receptacle
- 3406 - Straight plug
- 3408 - 90° plug
- 3409 - 45° plug
- 3412 - Box mount receptacle with rear threads

### ***The single character which follows indicates the connector service class:***

- D - High Shock
- K - Firewall
- L - High Temperature
- W - General Purpose

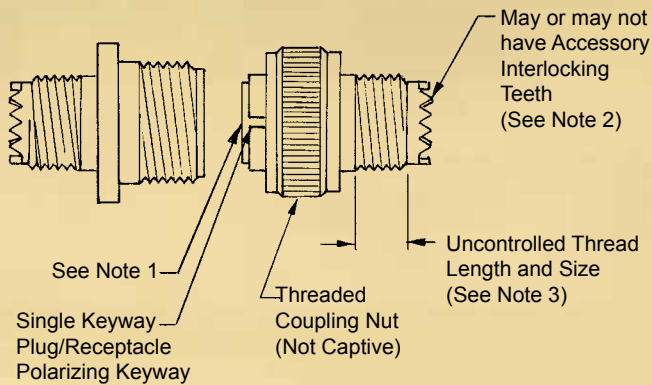
The next character, S in our example, indicates the shell material; in this case stainless steel. The next two characters, 28 in our example, identify the shell size. The following pair of numbers, 21 in our example, identifies the contact arrangement. If this pair of characters is followed by an "S," it indicates female-style (socket) contacts. If they are followed by a "P," it indicates male contacts (Pin). The final character, Y in our example, indicates the choice of polarization keying.

That's all there is to it. While there are many part number complexities and nuances throughout the various MS connector families, they all follow the same basic approach to part number development.

## DESIGN ELEMENTS OF COMMON MILITARY STANDARD CONNECTORS

The following pages recap standard circular military connector design features including illustrations of the individual design characteristics important to the accessory manufacturer when selecting or designing backshells.

### SAE AS50151 Connectors, Circular, MS3100 Series, Solder Types; Glenair Designator Code B (Glenair equivalent: IT)



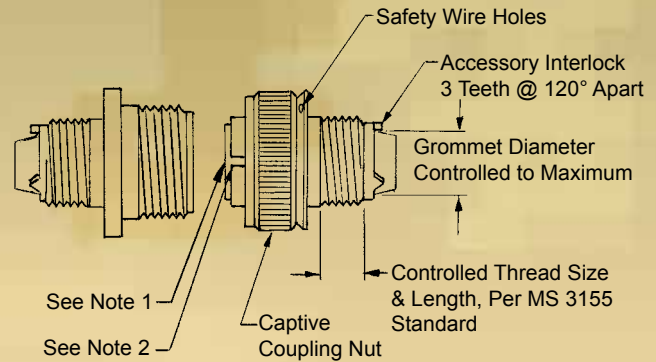
#### Design Features:

- Threaded coupling design.
- Fifteen shell sizes—Range 8 thru 48 (.500" to 3.000" diameter).
- Wide variety of contact sizes, standard density; 1 to 100 contacts.
- Conductive finish—Cadmium/Olive drab, 96-hour corrosion protection.

#### Notes:

1. Contacts may mate prior to connector shell mating.
2. Single keying may not always ensure shell polarizing.
3. Uncontrolled accessory interface.
4. Plug or receptacle may have pin or socket contacts.
5. Connector shell may strike pin contacts, thus power should always be on socket contacts.

### SAE AS50151 Connectors, Circular MS3400 (Front Release Contact) and MS3450 (Rear Release Contact) Series Crimp Type Contacts; Glenair Designator Code A



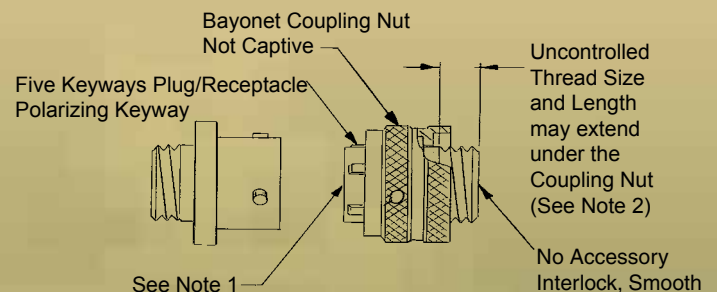
#### Design Features:

- Threaded coupling design, captive.
- Fifteen shell sizes—Range 8 thru 48 (.500" to 3.000" diameter).
- Wide variety of contact sizes, standard density; 1 to 100 contacts.
- Cadmium/Olive drab conductive finish, 500 hour salt spray; electroless-nickel options.

#### Notes:

1. Same interface features as MS3100 and MS3106; intermateable.
2. Single keying may not always ensure shell polarizing.

### MIL-C-26482 Connectors, Circular MS3110 and MS3116 Series 1, Solder Contacts Glenair Designator Code D (Glenair equivalent: IPT)



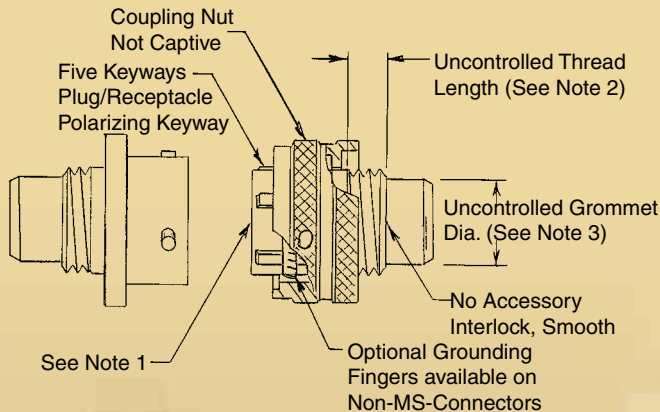
**Design Features:**

- Bayonet coupling design, quick disconnect.
- Ten shell sizes—Range 6 through 24 (.3750" to 1.500" diameter).
- 12, 16, and 20 gauge contacts, standard density, 3 to 61 contacts.
- Conductive and non-conductive finishes; Cadmium/Olive drab and anodic.

**Notes:**

1. Contacts may mate prior to connector shell mating.
2. Plug may have less than three threads.

**MIL-C-26482 Connectors, Circular, MS3120 and MS3126 Series 1, Crimp Contacts, Front Release; Glenair Designator Code D (Glenair equivalent: IPT SE)**



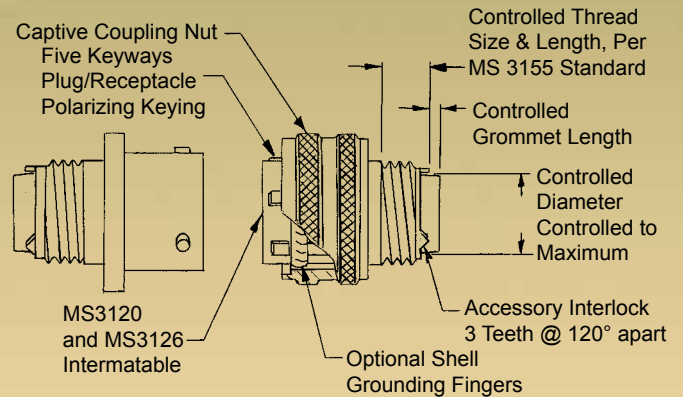
**Design Features:**

- Bayonet coupling design, quick disconnect.
- Eight shell sizes—Range 8 thru 24 (.500" to 1.500" diameter).
- 12, 16, 20, and 22 gauge contacts, standard density, 3 to 61 contacts.

**Notes:**

1. Contacts may mate prior to connector shell mating when grounding fingers not supplied.
2. Same limitations as MS3110 and MS3116 solder type connectors.
3. Uncontrolled wire seal grommet geometry; accessories properly mate.

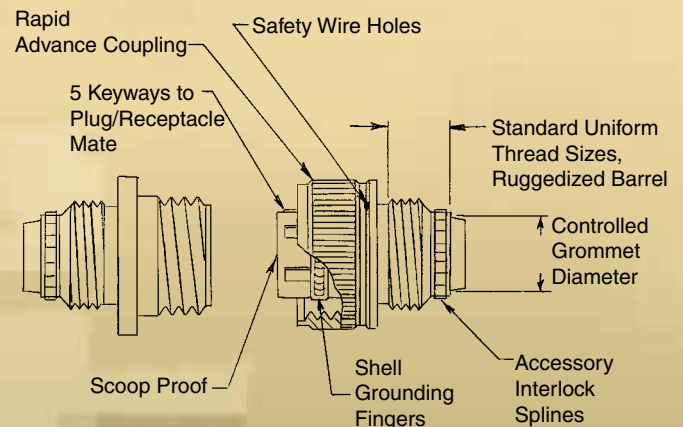
**MIL-C-26482 Connectors, Circular, MS3470 Series 2, Crimp Contacts, Rear Release; Glenair Designator Code A**



**Design Features:**

- Bayonet coupling design, quick disconnect.
- Nine shell sizes—8 through 24 (.500" to 1.500" dia)
- 12, 16, 20, and 22 gauge contacts, standard density, 3 to 61 contacts.

**MIL-DTL-28840 Connectors, Circular, Front Release, Crimp Contacts Glenair Designator Code G**

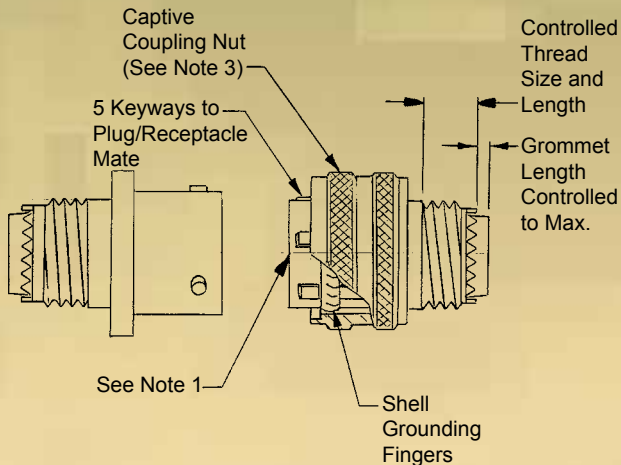


**Design Features:**

- Threaded coupling design, rapid advance, captive, scoop proof.
- Nine shell sizes—Range 11 through 33 (.500 to 2.000 diameter).
- 20 gauge high density contacts, 7 to 155.



**MIL-DTL-38999 Connectors, Series I  
Crimp Contacts, Rear Release;  
Glenair Designator Code F  
(Glenair Series 231-105\*)**



**Design Features:**

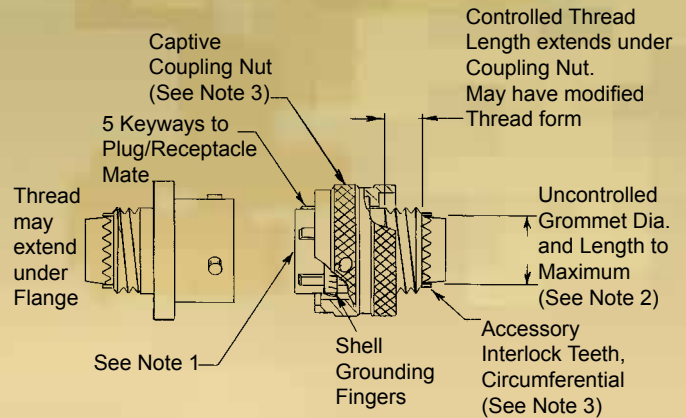
- Bayonet coupling design, quick disconnect.
- Nine shell sizes—Range 8 through 24 (.500" to 1.500" diameter).
- 8, 10, 12, 16, 20, and 22 gauge contacts, standard density and 22 gauge high density arrangements; 3 to 128 contacts.
- Scoop-proof shell design to prevent shell to contact problem.
- Controlled accessory interface per MIL-DTL-38999, figure 11.
- Cork and bottle primary insert interface seal and shell environmental seal, fuel resistant silicone elastomers.
- Conductive and non-conductive finishes; electroless nickel, Cadmium/Olive drab 500 hour salt spray, and anodic.

**Notes:**

1. Long barrel design to prevent shell striking contacts.
2. Serrated accessory interlocking tooth design may prevent reliable moisture seal or EMI bond to accessories.
3. Bayonet coupling may not perform under severe conditions with large diameter cable and backshell.

\* In development

**MIL-DTL-38999 Connectors, Series II  
Crimp Type Contacts, Rear Release; Glenair  
Designator Code F  
(Glenair Series 232-105\*)**



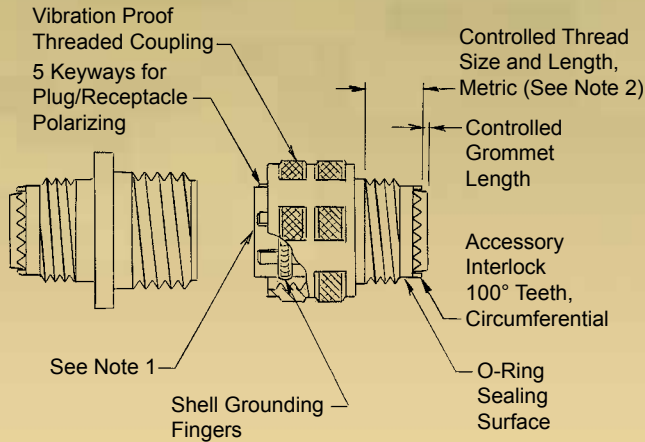
**Design Features:**

- Bayonet coupling design, quick disconnect, captive.
- Nine shell sizes—Range 8 through 24 (.500" to 1.500" diameter).
- 16, 20, and 22 gauge contacts, standard density and 22 gauge high density arrangements; 3 to 128 contacts.
- Shell ground available on MS and commercial part numbers.
- Controlled accessory interface per MIL-DTL-38999 figure II.
- Cork and bottle primary interface and shell environmental seals, fluid resistant silicone elastomers.
- Conductive and non-conductive finishes; electroless nickel, Cadmium/Olive drab, 500-hour salt spray, and anodic.
- Short barrel construction for minimum envelope.

**Notes:**

1. Very short barrel, shell may strike pin contacts.
2. Wire seal grommet controlled to maximum condition only, over compression will cause contact splaying.
3. Same limitations as D38999 Series I.

**MIL-DTL-38999 Connectors, Series III  
Circular, Crimp Contacts  
Rear Release; Glenair Code H  
(Glenair Equivalent 233-105\*)**



**Design Features:**

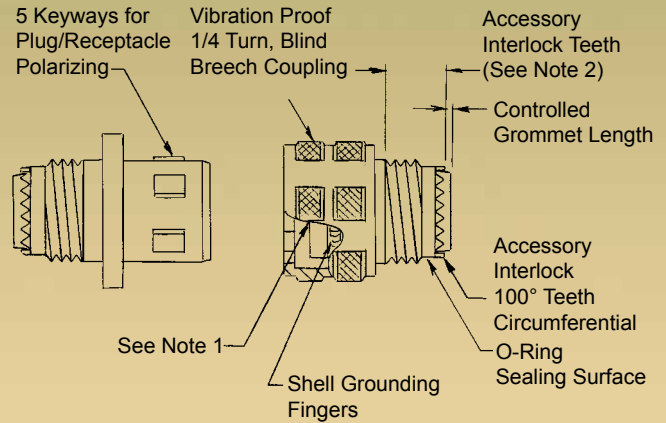
- Threaded coupling design, rapid advance, self-locking.
- Nine shell sizes—Range 9 through 25 (.500" to 1.500" diameter).
- 8, 10, 12, 16, 20, and 22 gauge contacts, standard density and 22 gauge high density arrangements; 3 to 128 contacts.
- 16 gauge fiber-optic insert arrangement.
- Scoop-proof shell design to prevent shell to contact problem.
- Controlled accessory interface with metric threads.
- Diaphragm contact seal interface and shell environmental seal, fluid resistant fluorosilicone elastomers.
- Conductive and non-conductive finishes; Cadmium/Olive drab 500 hour salt spray, electroless nickel, anodic and stainless steel.
- Conductive composite shell, cadmium/olive drab over electroless nickel, and electroless nickel, 2000 hour salt spray.

**Notes:**

1. Same barrel features as MIL-DTL-38999 Series I, except metric threads.
2. 100 percent scoop proof, positive shell mating.

\* Meets requirements

**MIL-DTL-38999 Connectors, Series IV  
Circular, Crimp Contacts  
Rear Release; Glenair Code H  
(Glenair Series 234-105\*\*)**



**Design Features:**

- Breech lock coupling design, rapid advance, self-locking.
- Eight shell sizes—Range 11 through 25 (.500" to 1.500" diameter).
- 12, 16, 20, and 22 gauge contacts, standard density and 22 gauge high density arrangements; 3 to 128 contacts.
- 16 gauge fiber-optic insert arrangements.
- Scoop proof shell design to prevent shell to contact problems.
- Controlled accessory interface with metric threads.
- Ruggedized construction for shipboard service.
- Cork and bottle primary interface and shell environmental seals, fluid resistant fluorosilicone elastomers.
- Conductive and non-conductive finishes; Cadmium/Olive drab 500 hour salt spray, electroless nickel, anodic, and stainless steel.

**Notes:**

1. 100 percent scoop proof, positive shell mating.
2. Same accessory interlock teeth as MIL-DTL-38999, Series III.
3. Same O-ring seal features as MIL-DTL-38999, Series III.

\*\* Possible future development

# MILITARY STANDARD CONNECTOR INDEX

The following is a listing of circular connectors defined by US Military Specifications, cross-referenced to the applicable active or inactive part

number series. The symbols in the Connector Designator column are an essential element in Glenair's backshell part number developments.

| PART NO. | CONN. DESIGN. | SPECIFICATION | SERIES | DESCRIPTION                                       |
|----------|---------------|---------------|--------|---|
| MS3100   | B             | SAE AS50151   | MS3100 | Receptacle Wall Mount (Solder)***                 |
| MS3101   | B             | SAE AS50151   | MS3100 | Plug (Solder)***                                  |
| MS3102   | **            | SAE AS50151   | MS3100 | Receptacle Box Mount (Solder)***                  |
| MS3103   | **            | SAE AS50151   | MS3100 | Receptacle Potting (Solder)***                    |
| MS3105   | **            | SAE AS50151   | MS3100 | Dummy Receptacle***                               |
| MS3106   | B             | SAE AS50151   | MS3100 | Plug Straight (Solder)***                         |
| MS3107   | B             | SAE AS50151   | MS3100 | Plug Quick Disconnect (Solder)***                 |
| MS3108   | B             | SAE AS50151   | MS3100 | Plug 90° (Solder)***                              |
| MS3110   | D-729         | MIL-DTL-26482 | 1      | Receptacle Wall Mount                             |
| MS3111   | D             | MIL-DTL-26482 | 1      | Plug Cable Connecting                             |
| MS3112   | **            | MIL-DTL-26482 | 1      | Receptacle Box Mount                              |
| MS3113   | **            | MIL-DTL-26482 | 1      | Receptacle Solder Mount                           |
| MS3114   | D-717         | MIL-DTL-26482 | 1      | Receptacle Jam Nut                                |
| MS3115   | **            | MIL-DTL-26482 | 1-2    | Dummy Receptacle                                  |
| MS3116   | D             | MIL-DTL-26482 | 1      | Plug Straight                                     |
| MS3119   | **            | MIL-DTL-26482 | 1      | Receptacle Thru-Bulkhead                          |
| MS3120   | D             | MIL-DTL-26482 | 1      | Receptacle Wall Mount (Crimp)                     |
| MS3121   | D             | MIL-DTL-26482 | 1      | Plug Straight (Crimp)                             |
| MS3122   | **            | MIL-DTL-26482 | 1      | Receptacle Box Mount (Crimp)                      |
| MS3124   | D-717         | MIL-DTL-26482 | 1      | Receptacle Rear Mount Jam Nut (Crimp)             |
| MS3126   | D             | MIL-DTL-26482 | 1      | Plug Straight (Crimp)                             |
| MS3127   | **            | MIL-DTL-26482 | 1      | Receptacle Box Mount (Crimp)                      |
| MS3128   | D             | MIL-DTL-26482 | 1      | Receptacle Wall Mount (Crimp)                     |
| MS3130   | *             | QPL-81703     | 1      | Receptacle Push Pull Wall Mount Flange            |
| MS3132   | X-706         | QPL-81703     | 1      | Receptacle Push Pull Box Mount                    |
| MS3134   | X-706         | QPL-81703     | 1      | Receptacle Push Pull Jam Nut                      |
| MS3135   | **            | QPL-81703     | 1      | Dummy Receptacle                                  |
| MS3137   | X-706         | QPL-81703     | 1      | Plug Straight Push Pull                           |
| MS3138   | X-706         | QPL-81703     | 1      | Plug Lanyard Push Pull                            |
| MS3139   | **            | QPL-81703     | 1      | Receptacle Thru-Bulkhead (Wall Mount)             |
| MS3140   | X-706B        | QPL-81703     | 2      | Receptacle Push Pull Wall Mount                   |
| MS3142   | **            | MIL-C-5015    | MS3100 | Receptacle Hermetic Box Mount (Solder)            |
| MS3143   | **            | MIL-C-5015    | MS3100 | Receptacle Hermetic Solder Mount                  |
| MS3144   | X-706B        | QPL-81703     | 2      | Receptacle Push Pull Jam Nut                      |
| MS3145   | **            | QPL-81703     | 3      | Receptacle Hermetic Push Pull Box Mount           |
| MS3146   | **            | QPL-81703     | 3      | Receptacle Push Pull Hermetic Solder Mount        |
| MS3147   | X-706B        | QPL-81703     | 2      | Plug Push Pull (Crimp)                            |
| MS3148   | X-706B        | QPL-81703     | 2      | Plug Push Pull Lanyard (Crimp)                    |
| MS3149   | **            | QPL-81703     | 3      | Receptacle Push Pull Hermetic (Single-Hole Mount) |
| MS3400   | A             | MIL-C-5015    | MS3400 | Receptacle Wall Mount (Crimp)                     |

\* Consult Factory

\*\* Connector does not accommodate rear accessories

\*\*\*Inactive for new design



# Military Standard Connector Index

| PART NO. | CONN. DESIGN. | SPECIFICATION | SERIES | DESCRIPTION                                       |
|----------|---------------|---------------|--------|---|
| MS3401   | A             | SAE AS50151   | MS3400 | Receptacle Cable Connecting (Crimp)               |
| MS3402   | **            | SAE AS50151   | MS3400 | Receptacle,Box Mount (Crimp)                      |
| MS3404   | A             | SAE AS50151   | MS3400 | Receptacle Jam Nut (Crimp)                        |
| MS3406   | A             | SAE AS50151   | MS3400 | Plug (Crimp)                                      |
| MS3408   | A             | SAE AS50151   | MS3400 | Plug 90° (Crimp)                                  |
| MS3409   | A             | SAE AS50151   | MS3400 | Plug 45° (Crimp)                                  |
| MS3412   | A             | SAE AS50151   | MS3400 | Receptacle Wall Mount (Crimp)                     |
| MS3424   | A             | SAE AS81703   | 3      | Receptacle Push Pull Wall Mount                   |
| MS3440   | **            | MIL-DTL-26482 | 2      | Receptacle Narrow Flange Mount (was M83723/9/10)  |
| MS3442   | **            | MIL-DTL-26482 | 2      | Receptacle Wide Flange Mount                      |
| MS3443   | **            | MIL-DTL-26482 | 2      | Receptacle Solder Flange Mount                    |
| MS3445   | *             | QPL-81703     | 2      | Plug Push Pull Rack & Panel Mount                 |
| MS3446   | A             | QPL-81703     | 3      | Plug Push Pull Rack & Panel Mount                 |
| MS3449   | **            | MIL-DTL-26482 | 2      | Receptacle Push Pull Single Hole Mount            |
| MS3450   | A             | SAE AS50151   | MS3450 | Receptacle Wall Mount (was M83723/19/20) (Crimp)  |
| MS3451   | A             | SAE AS50151   | MS3450 | Receptc Cbl Connecting (was M83723/17/18) (Crimp) |
| MS3452   | **            | SAE AS50151   | MS3450 | Receptacle Box Mount (was M83723/21/22) (Crimp)   |
| MS3454   | A             | SAE AS50151   | MS3450 | Receptacle Jam Nut (Crimp)                        |
| MS3456   | A             | SAE AS50151   | MS3450 | Plug Straight (was M83723/23/24) (Crimp)          |
| MS3459   | A             | SAE AS50151   | MS3450 | Plug Straight Self Locking (was M83723/52/53)     |
| MS3463   | **            | QPL-81703     | 3      | Receptacle Push Pull (Hermetic)                   |
| MS3464   | A             | QPL-81703     | 3      | Receptacle Push Pull Jam Nut                      |
| MS3466   | **            | QPL-81703     | 3      | Receptacle Push Pull Hermetic (Box Mount)         |
| MS3467   | A             | QPL-81703     | 3      | Plug Push Pull                                    |
| MS3468   | A             | QPL-81703     | 3      | Plug Push Pull Lanyard                            |
| MS3469   | **            | QPL-81703     | 3      | Receptacle Push Pull Hermetic Jam Nut             |
| MS3470   | A             | MIL-DTL-26482 | 2      | Receptacle Narrow Flange Mount (was M83723/1/2)   |
| MS3471   | A             | MIL-DTL-26482 | 2      | Receptacle Cable Connecting (was M83723/7/8)      |
| MS3472   | A             | MIL-DTL-26482 | 2      | Receptacle Wide Flange Mount (was M83723/3/4)     |
| MS3473   | **            | MIL-DTL-26482 | 2      | Receptacle Solder Mount Hermetic                  |
| MS3474   | A             | MIL-DTL-26482 | 2      | Receptacle Rear Mount Jam Nut (was M83723/5/6)    |
| MS3475   | A             | MIL-DTL-26482 | 2      | Plug RFI Shielded (was M83723/42/43)              |
| MS3476   | A             | MIL-DTL-26482 | 2      | Plug Straight (was M83723/13/14)                  |
| MS3477   | **            | MIL-DTL-26482 | 2      | Receptacle Hermetic Box Mount                     |
| MS3479   | **            | MIL-DTL-26482 | 2      | Receptacle Hermetic Rear Mount Jam Nut            |
| MS17343  | C             | MIL-DTL-22992 | R      | Receptacle Wall Mount                             |
| MS17344  | C             | MIL-DTL-22992 | R      | Plug Straight                                     |
| MS17345  | C             | MIL-DTL-22992 | R      | Plug Cable Connecting (Female)                    |
| MS17346  | C             | MIL-DTL-22992 | R      | Receptacle Box Mount                              |
| MS17347  | C             | MIL-DTL-22992 | R      | Receptacle Jam Nut                                |
| MS17348  | **            | MIL-DTL-22992 | R      | Receptacle Jam Nut Box Mount                      |
| MS18062  | **            | MIL-DTL-22992 | R      | Dummy Receptacle                                  |
| MS20026  | *             | MIL-DTL-27599 | I      | Receptacle Wall Mount Solder***                   |
| MS20027  | *             | MIL-DTL-27599 | I      | Receptacle Line***                                |
| MS20028  | *             | MIL-DTL-27599 | I      | Plug Straight***                                  |
| MS20029  | **            | MIL-DTL-27599 | I      | Receptacle Jam Nut Mount***                       |
| MS20030  | *             | MIL-DTL-27599 | I      | Receptacle Box Mount Hermetic                     |

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| PART NO. | CONN. DESIGN. | SPECIFICATION | SERIES  | DESCRIPTION                                       |
|----------|---------------|---------------|---------|---|
| MS20031  | **            | MIL-DTL-27599 |         | Receptacle Jam Nut Hermetic***                    |
| MS20032  | **            | MIL-DTL-27599 |         | Receptacle Solder Mount Hermetic***               |
| MS20034  | *             | MIL-DTL-27599 |         | Receptacle Wall Mount***                          |
| MS20035  | *             | MIL-DTL-27599 |         | Receptacle Box Mount***                           |
| MS24264  | E             | MIL-C-26500   | F G & R | Receptacle Flange Mount*** Use MIL-DTL-83723      |
| MS24265  | E             | MIL-C-26500   | F G & R | Receptacle Single Hole Mount*** Use MIL-DTL-83723 |
| MS24266  | E             | MIL-C-26500   | F G & R | Plug Straight*** Use MIL-DTL-83723                |
| MS25183  | **            | SAE AS50151   | MS3100  | Plug Potting Seal (Solder)                        |
| MS27034  | **            | MIL-C-26500   |         | Receptacle Hermetic Solder Mount                  |
| MS27334  | *             | MIL-DTL-27599 |         | Receptacle Wall Mount ***                         |
| MS27335  | **            | MIL-DTL-27599 |         | Receptacle Box Mount ***                          |
| MS27336  | *             | MIL-DTL-27599 |         | Plug Straight ***                                 |
| MS27337  | *             | MIL-DTL-27599 |         | Receptacle Jam Nut ***                            |
| MS27338  | *             | MIL-DTL-27599 |         | Receptacle Wall Mount Hermetic                    |
| MS27339  | **            | MIL-DTL-27599 |         | Receptacle Box Mount Hermetic                     |
| MS27340  | **            | MIL-DTL-27599 |         | Receptacle Jam Nut Mount Hermetic                 |
| MS27341  | **            | MIL-DTL-27599 |         | Receptacle Solder Mount Hermetic                  |
| MS27466  | F             | MIL-DTL-38999 | I       | Receptacle Wall Mount                             |
| MS27467  | F             | MIL-DTL-38999 | I       | Plug Straight                                     |
| MS27468  | F             | MIL-DTL-38999 | I       | Receptacle Jam Nut                                |
| MS27469  | **            | MIL-DTL-38999 | I       | Receptacle Wall Mount Hermetic                    |
| MS27470  | **            | MIL-DTL-38999 | I       | Receptacle Jam Nut Hermetic                       |
| MS27471  | **            | MIL-DTL-38999 | I       | Receptacle Solder Mount Hermetic                  |
| MS27472  | F             | MIL-DTL-38999 | II      | Receptacle Wall Mount                             |
| MS27473  | F             | MIL-DTL-38999 | II      | Plug Straight                                     |
| MS27474  | F             | MIL-DTL-38999 | II      | Receptacle Jam Nut                                |
| MS27475  | F             | MIL-DTL-38999 | II      | Receptacle Wall Mount                             |
| MS27476  | **            | MIL-DTL-38999 | II      | Receptacle Box Mount Hermetic                     |
| MS27477  | **            | MIL-DTL-38999 | II      | Receptacle Jam Nut Hermetic                       |
| MS27478  | **            | MIL-DTL-38999 | II      | Receptacle Solder Mount Hermetic                  |
| MS27479  | F             | MIL-DTL-38999 | II      | Inactive Use MS27472                              |
| MS27480  | F             | MIL-DTL-38999 | II      | Inactive Use MS27473                              |
| MS27481  | F             | MIL-DTL-38999 | II      | Inactive Use MS27474                              |
| MS27482  | F             | MIL-DTL-38999 | II      | Inactive Use MS27475                              |
| MS27483  | **            | MIL-DTL-38999 | II      | Inactive Use MS27474                              |
| MS27484P | **            | MIL-DTL-38999 | II      | Plug Straight                                     |
| MS27484T | F             | MIL-DTL-38999 | II      | Plug Straight                                     |
| MS27496  | **            | MIL-DTL-38999 | I       | Receptacle Box Mount                              |
| MS27497  | F             | MIL-DTL-38999 | II      | Receptacle Back Panel Wall Mount                  |
| MS27498  | F             | MIL-DTL-38999 | I       | Plug 90° (MS27467)                                |
| MS27499  | **            | MIL-DTL-38999 | II      | Receptacle Box Mount                              |
| MS27500  | F             | MIL-DTL-38999 | II      | Inactive See MS27473                              |
| MS27503  | **            | MIL-DTL-38999 | II      | Inactive See MS27478                              |
| MS27504  | **            | MIL-DTL-38999 | II      | Inactive See MS27499                              |
| MS27505  | **            | MIL-DTL-38999 | I       | Receptacle Back Panel Box Mount                   |
| MS27508  | **            | MIL-DTL-38999 | II      | Receptacle Back Panel Box Mount                   |
| MS27513  | **            | MIL-DTL-38999 | II      | Receptacle Box Mount                              |

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| PART NO.  | CONN. DESIGN. | SPECIFICATION | SERIES | DESCRIPTION                                       |
|-----------|---------------|---------------|--------|---|
| MS27515   | F             | MIL-DTL-38999 | I      | Inactive Use MS27656                              |
| MS27613   | E-710         | MIL-DTL-26500 |        | Receptacle Panel Mount ***Use MIL-DTL-83723       |
| MS27614   | E-710         | MIL-DTL-26500 |        | Receptacle D-Hole Mount ***Use MIL-DTL-83723      |
| MS27615   | E-710         | MIL-DTL-26500 |        | Plug Straight ***Use MIL-DTL-83723                |
| MS27652   | F             | MIL-DTL-38999 | I      | Inactive Use MS27466                              |
| MS27653   | F             | MIL-DTL-38999 | I      | Inactive Use MS27467                              |
| MS27654   | F             | MIL-DTL-38999 | I      | Inactive Use MS27656                              |
| MS27656   | F             | MIL-DTL-38999 | I      | Receptacle Back Panel Wall Mount (MS27499)        |
| MS27661   | F-752         | MIL-DTL-38999 | I      | Plug Lanyard Release                              |
| MS27662   | **            | MIL-DTL-38999 | I      | Receptacle Thru-Bulkhead                          |
| MS27664   | **            | MIL-DTL-38999 | II     | Receptacle Back-Panel Wall Mount                  |
| MS27665   | F             | MIL-DTL-38999 | I      | Plug Rack & Panel Mount                           |
| MS27667   | **            | MIL-DTL-38999 | II     | Receptacle Thru-Bulkhead                          |
| MS90555   | *             | MIL-DTL-22992 | L      | Receptacle Wall Mount                             |
| MS90556   | *             | MIL-DTL-22992 | L      | Plug Straight                                     |
| MS90557   | *             | MIL-DTL-22992 | L      | Plug Cable Connecting                             |
| MS90558   | *             | MIL-DTL-22992 | L      | Receptacle w/Coupling Ring Wall Mount             |
| M28840/10 | G             | MIL-DTL-28840 |        | Receptacle Wall Mount                             |
| M28840/11 | G             | MIL-DTL-28840 |        | Receptacle Cable Connecting                       |
| M28840/12 | **            | MIL-DTL-28840 |        | Receptacle Box Mount                              |
| M28840/14 | G             | MIL-DTL-28840 |        | Receptacle Jam Nut                                |
| M28840/16 | G             | MIL-DTL-28840 |        | Plug Straight                                     |
| D38999/20 | H             | MIL-DTL-38999 | III    | Receptacle Wall Mount                             |
| D38999/21 | **            | MIL-DTL-38999 | III    | Receptacle Hermetic (Box Mount)                   |
| D38999/23 | **            | MIL-DTL-38999 | III    | Receptacle Hermetic Jam Nut                       |
| D38999/24 | H             | MIL-DTL-38999 | III    | Receptacle Jam Nut                                |
| D38999/25 | **            | MIL-DTL-38999 | III    | Receptacle Hermetic Solder Mount                  |
| D38999/26 | H             | MIL-DTL-38999 | III    | Plug Straight                                     |
| D38999/27 | **            | MIL-DTL-38999 | III    | Receptacle Hermetic Weld Mount                    |
| D38999/29 | H-701         | MIL-DTL-38999 | III    | Plug Lanyard Release                              |
| D38999/30 | H-701         | MIL-DTL-38999 | III    | Plug Lanyard Release                              |
| D38999/31 | H             | MIL-DTL-38999 | III    | Plug Lanyard Release                              |
| D38999/36 | H             | MIL-DTL-38999 | III    | Plug Lanyard Release                              |
| D38999/40 | H             | MIL-DTL-38999 | IV     | Receptacle Wall Mount                             |
| D38999/41 | **            | MIL-DTL-38999 | IV     | Box Mount Receptacle Hermetic                     |
| D38999/42 | **            | MIL-DTL-38999 | IV     | Receptacle Box Mount                              |
| D38999/43 | H             | MIL-DTL-38999 | IV     | Jam Nut Mount Hermetic Receptacle                 |
| D38999/44 | H-715         | MIL-DTL-38999 | IV     | Receptacle Jam Nut                                |
| D38999/45 | **            | MIL-DTL-38999 | IV     | Solder Mount Hermetic Receptacle                  |
| D38999/46 | H             | MIL-DTL-38999 | IV     | Plug Straight EMI                                 |
| D38999/47 | H             | MIL-DTL-38999 | IV     | Plug Straight                                     |
| D38999/49 | H             | MIL-DTL-38999 | IV     | In Line Cable Receptacle                          |
| D38999/60 | H             | MIL-DTL-38999 | III    | Tight Tolerance Fiber Optic Plug                  |
| D38999/61 | H             | MIL-DTL-38999 | III    | Tight Tolerance Wall Mount Fiber Optic Receptacle |
| M81511/1  | J             | MIL-C-81511   | 2      | Receptacle Flange Mount                           |
| M81511/2  | **            | MIL-C-81511   | 2      | Receptacle Solder Flange                          |
| M81511/3  | J             | MIL-C-81511   | 2      | Receptacle Jam Nut                                |

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| PART NO.  | CONN. DESIGN. | SPECIFICATION | SERIES | DESCRIPTION                                    |
|-----------|---------------|---------------|--------|--|
| M81511/4  | **            | MIL-C-81511   | 2      | Receptacle Jam Nut ***                         |
| M81511/5  | J             | MIL-C-81511   | 2      | Plug Cable Connecting ***                      |
| M81511/6  | J             | MIL-C-81511   | 2      | Plug ***                                       |
| M81511/21 | J             | MIL-C-81511   | 1      | Receptacle Flange Mount ***                    |
| M81511/22 | **            | MIL-C-81511   | 1      | Receptacle Solder Flange Mount ***             |
| M81511/23 | J             | MIL-C-81511   | 1      | Receptacle Jam Nut ***                         |
| M81511/24 | **            | MIL-C-81511   | 1      | Receptacle Jam Nut ***                         |
| M81511/25 | J             | MIL-C-81511   | 1      | Receptacle Cable Connecting ***                |
| M81511/26 | J             | MIL-C-81511   | 1      | Plug ***                                       |
| M81511/27 | **            | MIL-C-81511   | 1      | Receptacle Thru-Bulkhead Jam Nut ***           |
| M81511/28 | **            | MIL-C-81511   | 2      | Receptacle Thru-Bulkhead Single Hole Mount *** |
| M81511/31 | J             | MIL-C-81511   | 2      | Receptacle Flange Mount ***                    |
| M81511/32 | J             | MIL-C-81511   | 2      | Receptacle Jam Nut Mount ***                   |
| M81511/33 | J             | MIL-C-81511   | 2      | Receptacle, Cable Connecting ***               |
| M81511/34 | J             | MIL-C-81511   | 2      | Plug ***                                       |
| M81511/35 | J             | MIL-C-81511   | 1      | Receptacle Flange Mount ***                    |
| M81511/36 | J             | MIL-C-81511   | 1      | Receptacle Jam Nut ***                         |
| M81511/37 | J             | MIL-C-81511   | 1      | Receptacle Cable Connecting ***                |
| M81511/38 | J             | MIL-C-81511   | 1      | Plug ***                                       |
| M81511/41 | J             | MIL-C-81511   | 3      | Receptacle Flange Mount ***                    |
| M81511/42 | **            | MIL-C-81511   | 3      | Receptacle Solder Flange Mount ***             |
| M81511/44 | **            | MIL-C-81511   | 3      | Receptacle Jam Nut ***                         |
| M81511/45 | J             | MIL-C-81511   | 3      | Receptacle Cable Connecting ***                |
| M81511/46 | J             | MIL-C-81511   | 3      | Plug ***                                       |
| M81511/47 | **            | MIL-C-81511   | 3      | Receptacle Solder Flange Mount ***             |
| M81511/48 | **            | MIL-C-81511   | 3      | Receptacle Jam Nut ***                         |
| M81511/49 | J             | MIL-C-81511   | 3      | Receptacle Jam Nut ***                         |
| M81511/50 | **            | MIL-C-81511   | 4      | Receptacle Jam Nut ***                         |
| M81511/51 | J             | MIL-C-81511   | 4      | Receptacle Flange Mount ***                    |
| M81511/52 | **            | MIL-C-81511   | 4      | Receptacle Solder Flange Mount ***             |
| M81511/53 | J             | MIL-C-81511   | 4      | Receptacle Jam Nut ***                         |
| M81511/54 | **            | MIL-C-81511   | 4      | Receptacle Jam Nut ***                         |
| M81511/55 | J             | MIL-C-81511   | 4      | Receptacle Cable Connecting ***                |
| M81511/56 | J             | MIL-C-81511   | 4      | Plug ***                                       |
| M81511/57 | **            | MIL-C-81511   | 4      | Receptacle Solder Flange Mount ***             |
| M81582/1  | *             | MIL-C-81582   |        | Receptacle Jam Nut Mount ***                   |
| M81582/2  | *             | MIL-C-81582   |        | Plug Lanyard Release ***                       |
| M83723/1  | A             | MIL-DTL-83723 | I      | Superseded by MS3470                           |
| M83723/2  | A             | MIL-DTL-83723 | I      | Superseded by MS3470                           |
| M83723/3  | A             | MIL-DTL-83723 | I      | Superseded by MS3472                           |
| M83723/4  | A             | MIL-DTL-83723 | I      | Superseded by MS3472                           |
| M83723/5  | A             | MIL-DTL-83723 | I      | Superseded by MS3474                           |
| M83723/6  | A             | MIL-DTL-83723 | I      | Superseded by MS3474                           |
| M83723/7  | A             | MIL-DTL-83723 | I      | Superseded by MS3471                           |
| M83723/8  | A             | MIL-DTL-83723 | I      | Superseded by MS3471                           |
| M83723/9  | **            | MIL-DTL-83723 | I      | Superseded by MS3440                           |
| M83723/10 | **            | MIL-DTL-83723 | I      | Superseded by MS3442                           |

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| PART NO.  | CONN. DESIGN. | SPECIFICATION | SERIES | DESCRIPTION   |
|-----------|---------------|---------------|--------|---|
| M83723/11 | **            | MIL-DTL-83723 | I      | Superseded by MS3443                                |
| M83723/12 | **            | MIL-DTL-83723 | I      | Superseded by MS3443                                |
| M83723/13 | A             | MIL-DTL-83723 | I      | Superseded by MS3476                                |
| M83723/14 | A             | MIL-DTL-83723 | I      | Superseded by MS3476                                |
| M83723/17 | K             | MIL-DTL-83723 | II     | Superseded by MS3451 ***                            |
| M83723/18 | K             | MIL-DTL-83723 | II     | Superseded by MS3451 ***                            |
| M83723/19 | K             | MIL-DTL-83723 | II     | Superseded by MS3450 ***                            |
| M83723/20 | K             | MIL-DTL-83723 | II     | Superseded by MS3450 ***                            |
| M83723/21 | **            | MIL-DTL-83723 | II     | Superseded by MS3452 ***                            |
| M83723/22 | **            | MIL-DTL-83723 | II     | Superseded by MS3452 ***                            |
| M83723/23 | K             | MIL-DTL-83723 | II     | Superseded by MS3456 ***                            |
| M83723/24 | K             | MIL-DTL-83723 | II     | Superseded by MS3456 ***                            |
| M83723/25 | **            | MIL-DTL-83723 | II     | Superseded by MS3142 ***                            |
| M83723/26 | **            | MIL-DTL-83723 | II     | Superseded by MS3143 ***                            |
| M83723/36 | A             | MIL-DTL-83723 | I      | Inactive For New Design                             |
| M83723/37 | A             | MIL-DTL-83723 | I      | Inactive For New Design                             |
| M83723/38 | A             | MIL-DTL-83723 | I      | Inactive For New Design                             |
| M83723/39 | A             | MIL-DTL-83723 | I      | Inactive For New Design                             |
| M83723/40 | A             | MIL-DTL-83723 | I      | Inactive For New Design                             |
| M83723/41 | A             | MIL-DTL-83723 | I      | Inactive For New Design                             |
| M83723/42 | A             | MIL-DTL-83723 | I      | Superseded by MS3475                                |
| M83723/43 | A             | MIL-DTL-83723 | I      | Superseded by MS3475                                |
| M83723/45 | **            | MIL-DTL-83723 | I      | Superseded by MS3115                                |
| M83723/48 | A             | MIL-DTL-83723 | I      | Inactive For New Design                             |
| M83723/49 | A             | MIL-DTL-83723 | I      | Inactive For New Design                             |
| M83723/52 | K             | MIL-DTL-83723 | II     | Superseded by MS3459                                |
| M83723/53 | K             | MIL-DTL-83723 | II     | Superseded by MS3459                                |
| M83723/66 | A             | MIL-DTL-83723 | III    | Plug Push Pull (Pin Contacts)                       |
| M83723/67 | A             | MIL-DTL-83723 | III    | Plug Push Pull (Socket Contacts)                    |
| M83723/68 | A             | MIL-DTL-83723 | III    | Plug Push Pull Lanyard (Pin Contacts)               |
| M83723/69 | A             | MIL-DTL-83723 | III    | Plug Push Pull Lanyard (Socket Contacts)            |
| M83723/71 | A             | MIL-DTL-83723 | III    | Receptacle Bayonet Flange Mount (Socket Contact)    |
| M83723/72 | A             | MIL-DTL-83723 | III    | Receptacle Bayonet Flange Mount (Pin Contact)       |
| M83723/73 | A             | MIL-DTL-83723 | III    | Receptc Bayonet Single Hole Mount (Socket Contact)  |
| M83723/74 | A             | MIL-DTL-83723 | III    | Receptacle Bayonet Single Mount (Pin Contact)       |
| M83723/75 | A             | MIL-DTL-83723 | III    | Plug Bayonet (Socket Contact)                       |
| M83723/76 | A             | MIL-DTL-83723 | III    | Plug Bayonet (Pin Contact)                          |
| M83723/77 | A             | MIL-DTL-83723 | III    | Plug Bayonet RFI (Socket Contact)                   |
| M83723/78 | A             | MIL-DTL-83723 | III    | Plug Bayonet RFI (Pin Contact)                      |
| M83723/79 | **            | MIL-DTL-83723 | III    | Receptacle Bayonet Flange Mount Hermetic            |
| M83723/80 | **            | MIL-DTL-83723 | III    | Receptacle Bayonet Solder Flange Mount Hermetic     |
| M83723/81 | **            | MIL-DTL-83723 | III    | Receptacle Bayonet Single Hole Mount Hermetic       |
| M83723/82 | A             | MIL-DTL-83723 | III    | Receptacle Threaded Flange Mount (Socket Contact)   |
| M83723/83 | A             | MIL-DTL-83723 | III    | Receptacle Threaded Flange Mount (Pin Contact)      |
| M83723/84 | A             | MIL-DTL-83723 | III    | Receptc Threaded Single Hole Mount (Socket Contact) |
| M83723/85 | A             | MIL-DTL-83723 | III    | Receptacle Threaded Single Hole Mount (Pin Contact) |
| M83723/86 | A             | MIL-DTL-83723 | III    | Plug Threaded (Socket Contact)                      |

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| PART NO.  | CONN. DESIGN. | SPECIFICATION | SERIES | DESCRIPTION                                      |
|-----------|---------------|---------------|--------|--|
| M83723/87 | A             | MIL-DTL-83723 | III    | Plug Threaded (Pin Contact)                      |
| M83723/88 | **            | MIL-DTL-83723 | III    | Receptacle Threaded Flange Mount (Pin Contact)   |
| M83723/89 | **            | MIL-DTL-83723 | III    | Receptacle Threaded Single Hole Mount Hermetic   |
| M83723/90 | **            | MIL-DTL-83723 | III    | Receptacle Threaded Solder Flange Mount Hermetic |
| M83723/91 | A             | MIL-DTL-83723 | III    | Plug Threaded RFI (Socket Contact)               |
| M83723/92 | A             | MIL-DTL-83723 | III    | Plug Threaded RFI (Pin Contact)                  |
| M83723/93 | **            | MIL-DTL-83723 | III    | Receptacle Bayonet Solder Flange Mount Hermetic  |
| M83723/94 | **            | MIL-DTL-83723 | III    | Receptacle Bayonet Single Hole Mount Hermetic    |
| M83723/95 | A             | MIL-DTL-83723 | III    | Plug Threaded (Socket Contact) Self Locking      |
| M83723/96 | A             | MIL-DTL-83723 | III    | Plug Threaded (Pin Contact) Self Locking         |
| M83723/97 | A             | MIL-DTL-83723 | III    | Plug Threaded RFI (Socket Contact) Self Locking  |
| M83723/98 | A             | MIL-DTL-83723 | III    | Plug Threaded RFI (Pin Contact) Self Locking     |
| NATC00    | H*            | SSQ21635      |        | Receptacle Flange                                |
| NATC06    | H*            | SSQ21635      |        | Plug   |
| NATC07    | H*            | SSQ21635      |        | Receptacle Jam Nut                               |
| NATC09    | ***           | SSQ21635      |        | Receptacle Weld Mount                            |
| NATC77    | ***           | SSQ21635      |        | Receptacle Jam Nut Bulkhead Feed-Thru            |
| NATC99    | ***           | SSQ21635      |        | Receptacle Weld Mount                            |
| NBO       | A             | 40M39569      |        | Receptacle Flange Mount                          |
| NBOH      | **            | 40M39569      |        | Receptacle Hermetic                              |
| NB3H      | **            | 40M39569      |        | Receptacle Hermetic                              |
| NB4       | A             | 40M39569      |        | Receptacle Flange Mount                          |
| NB5H      | **            | 40M39569      |        | Thru-Bulkhead Hermetic                           |
| NB6       | A             | 40M39569      |        | Plug Straight                                    |
| NB6G      | A             | 40M39569      |        | Plug Straight,EMI                                |
| NB7       | A             | 40M39569      |        | Receptacle Jam Nut                               |
| NB7H      | **            | 40M39569      |        | Receptacle Hermetic                              |
| NB8H      | **            | 40M39569      |        | Receptacle Hermetic                              |
| NLSO      | F             | 40M38277      |        | Receptacle Flange Mount                          |
| NLS3H     | **            | 40M38277      |        | Receptacle Hermetic                              |
| NLS6      | F             | 40M38277      |        | Plug Straight                                    |
| NLS6G     | F             | 40M38277      |        | Plug Straight EMI                                |
| NLS7      | F             | 40M38277      |        | Receptacle Jam Nut                               |
| NLS7H     | **            | 40M38277      |        | Receptacle Jam Nut                               |
| NZGL00    | H**           | SSQ21635      |        | Receptacle Flange                                |
| NZGL03    | ***           | SSQ21635      |        | Receptacle Lever                                 |
| NZGL06    | H**           | SSQ21635      |        | Plug   |
| NZGL07    | H**           | SSQ21635      |        | Receptacle Weld Mount                            |
| NZGL09    | ***           | SSQ21635      |        | Receptacle Weld Mount                            |
| NZGL66    | H**           | SSQ21635      |        | Plug   |
| NZGL77    | ***           | SSQ21635      |        | Receptacle Jam Nut                               |
| NZGL99    | ***           | SSQ21635      |        | Receptacle Weld Mount                            |

\* Consult Factory

\*\* Connector does not accommodate rear accessories

\*\*\*Inactive for new design





# Military Specification Comparison Tables

| MILITARY SPECIFICATION                             | ENVIRONMENTAL AND MATERIAL CLASS | PERFORMANCE                                |                  |                    |
|--|----------------------------------|--|------------------|--------------------|
|  |                                  | DESCRIPTION                                | WATER RESISTANCE | RESILIENT MATERIAL |
| SAE AS50151<br>Solder<br>Series I<br>(IT)          | A                                | Non-Environmental Solid Shell              | Moisture-proof   | –                  |
|  | B                                | Non-Environmental Split Shell              | Moisture-proof   | –                  |
|  | C                                | Pressurized                                | Moisture-proof   | –                  |
|  | E                                | Environmental Grommet Seal                 | Moisture-proof   | Neoprene           |
|  | F                                | Environmental Grommet Seal with Clamp      | Moisture-proof   | Neoprene           |
|  | HS                               | Hermetic                                   | Submersible      | Silicone           |
|  | P                                | Environmental Potting Seal                 | Moisture-proof   | Polyamide          |
|  | K                                | Non-Environmental Firewall                 | Moisture-proof   | –                  |
|  | R                                | Environmental Grommet Seal with 'O' Ring   | Moisture-proof   | Neoprene           |
| SAE AS50151<br>Crimp<br>Front Release<br>Series II | D                                | Environmental High Shock                   | Splash-proof     | Silicone           |
|  | DJ                               | Environmental High Shock                   | Splash-proof     | Silicone           |
|  | DJS                              | Environmental High Shock                   | Splash-proof     | Silicone           |
|  | DS                               | Environmental High Shock                   | Splash-proof     | Silicone           |
|  | K                                | Environmental Firewall                     | Submersible      | Silicone           |
|  | KS                               | Environmental Firewall                     | Submersible      | Silicone           |
|  | KT                               | Environmental Firewall                     | Submersible      | Silicone           |
|  | L                                | Environmental High Temperature             | Submersible      | Silicone           |
|  | LS                               | Environmental High Temperature             | Submersible      | Silicone           |
|  | U                                | Environmental High Temperature             | Splash-proof     | Silicone           |
|  | US                               | Environmental High Temperature             | Splash-proof     | Silicone           |
|  | W                                | Environmental General Purpose              | Splash-proof     | Silicone           |
| SAE AS50151<br>Crimp<br>Rear Release<br>Series III | K                                | Environmental Firewall                     | Submersible      | Silicone           |
|  | KS                               | Environmental Firewall                     | Submersible      | Silicone           |
|  | KT                               | Environmental Firewall                     | Submersible      | Silicone           |
|  | L                                | Environmental High Temperature             | Submersible      | Silicone           |
|  | LS                               | Environmental High Temperature             | Submersible      | Silicone           |
|  | U                                | Environmental High Temperature             | Splash-proof     | Silicone           |
|  | US                               | Environmental High Temperature             | Splash-proof     | Silicone           |
|  | W                                | Environmental General Purpose              | Splash-proof     | Silicone           |
| MIL-C-10544  | ALL                              | Environmental Signal Corps Audio U Series  | Moisture-proof   | Neoprene           |
| MIL-C-12520  | ALL                              | Environmental Signal Corps Power UW Series | Moisture-proof   | Neoprene           |
| MIL-C-22249  | ALL                              | Environmental High Pressure Bulkhead       | Submersible      | Silicone           |
| MIL-C-22539  | ALL                              | Environmental High Pressure Bulkhead       | Submersible      | Dially Phthalate   |

|  | OPERATING TEMP | CONTACT TYPE                    |       |      | SIZE                      | SHELL                     |                    | COUPLING TYPE     |
|--|----------------|---------------------------------|-------|------|---------------------------|---------------------------|--------------------|-------------------|
|  |                | SOLDER or EYELET                | CRIMP |      |                           | SHELL MATERIAL            | FINISH DESCRIPTION |                   |
|  |                |                                 | FRONT | REAR |                           |                           |                    |                   |
|  | 125°C          | •                               | –     | –    | 16<br>12<br>8<br>4<br>1/0 | Aluminum                  | 96 hr. Cad O.D.    | Threaded          |
|  | 125°C          | •                               | –     | –    |                           | Aluminum                  | 96 hr. Cad O.D.    |                   |
|  | 125°C          | •                               | –     | –    |                           | Aluminum                  | 96 hr. Cad O.D.    |                   |
|  | 125°C          | •                               | –     | –    |                           | Aluminum                  | 96 hr. Cad O.D.    |                   |
|  | 125°C          | •                               | –     | –    |                           | Aluminum                  | 96 hr. Cad O.D.    |                   |
|  | 125°C          | •                               | –     | –    |                           | Stainless Steel           | 96 hr. Cad O.D.    |                   |
|  | 125°C          | •                               | –     | –    |                           | Aluminum                  | 96 hr. Cad O.D.    |                   |
|  | 125°C          | Non-Removable Crimp             |       |      |                           | Carbon Steel              | 96 hr. Cad O.D.    |                   |
|  | 125°C          | •                               | –     | –    |                           | Aluminum                  | 96 hr. Cad O.D.    |                   |
|  | 175°C          | –                               | •     | –    |                           | 16<br>12<br>8<br>4<br>1/0 | Aluminum           |                   |
|  | 175°C          | –                               | •     | –    | Aluminum                  |                           | 500 hr. Cad O.D.   |                   |
|  | 175°C          | –                               | •     | –    | Stainless Steel           |                           | Black Cad          |                   |
|  | 175°C          | –                               | •     | –    | Stainless Steel           |                           | Black Cad          |                   |
|  | 175°C          | –                               | •     | –    | Carbon Steel              |                           | Electroless Nickel |                   |
|  | 175°C          | –                               | •     | –    | Stainless Steel           |                           | Passivated         |                   |
|  | 175°C          | –                               | •     | –    | Carbon Steel              |                           | 96 hr. Cad O.D.    |                   |
|  | 200°C          | –                               | •     | –    | Aluminum                  |                           | Electroless Nickel |                   |
|  | 200°C          | –                               | •     | –    | Stainless Steel           |                           | Passivated         |                   |
|  | 200°C          | –                               | •     | –    | Aluminum                  |                           | Electroless Nickel |                   |
|  | 200°C          | –                               | •     | –    | Stainless Steel           |                           | Passivated         |                   |
|  | 175°C          | –                               | •     | –    | Aluminum                  |                           | 96 hr. Cad O.D.    |                   |
|  | 175°C          | –                               | –     | •    | Carbon Steel              |                           | Electroless Nickel |                   |
|  | 175°C          | –                               | –     | •    | Stainless Steel           |                           | Passivated         |                   |
|  | 175°C          | –                               | –     | •    | Carbon Steel              |                           | 96 hr. Cad O.D.    |                   |
|  | 200°C          | –                               | –     | •    | Aluminum                  | Electroless Nickel        |                    |                   |
|  | 200°C          | –                               | –     | •    | Stainless Steel           | Passivated                |                    |                   |
|  | 200°C          | –                               | –     | •    | Aluminum                  | Electroless Nickel        |                    |                   |
|  | 200°C          | –                               | –     | •    | Stainless Steel           | Passivated                |                    |                   |
|  | 175°C          | –                               | –     | •    | Aluminum                  | 96 hr. Cad O.D.           |                    |                   |
|  | 125°C          | Solder & Taper Pin Terminations |       |      | 16                        | Stainless Steel           | Passivated         | Reverse Bayonet   |
|  | 125°C          | •                               | –     | –    | 20<br>16<br>12<br>8       | Aluminum                  | Cad O.D.           | Center Lock Screw |
|  | 73°C           | •                               | –     | –    | 20<br>16                  | Stainless Steel           | Passivated         | Threaded          |
|  | 73°C           | •                               | –     | –    | 16<br>12                  | Stainless Steel           | Passivated         | Threaded          |

# Military Specification Comparison Tables (continued)

| MILITARY SPECIFICATION                | ENVIRONMENTAL AND MATERIAL CLASS | PERFORMANCE                             |                  |                    |
|---------------------------------------|----------------------------------|---|------------------|--------------------|
|                                       |                                  | DESCRIPTION                             | WATER RESISTANCE | RESILIENT MATERIAL |
| MIL-DTL-22992 Class C, J & R          | C*C*                             | Environmental Pressurized               | Moisture-proof   | Neoprene           |
|                                       | C*N*                             | Environmental Pressurized               | Moisture-proof   | Neoprene           |
|                                       | J*C*                             | Environmental Pressurized, with Grommet | Moisture-proof   | Neoprene           |
|                                       | J*N*                             | Environmental Pressurized, with Grommet | Moisture-proof   | Neoprene           |
|                                       | R*C*                             | Environmental                           | Moisture-proof   | Neoprene           |
|                                       | R*N*                             | Environmental                           | Moisture-proof   | Neoprene           |
| MIL-DTL-22992 Class L                 | L (C)                            | Environmental, Gland Seal Backshell     | Moisture-proof   | Neoprene           |
|                                       | L (N)                            | Environmental, Gland Seal Backshell     | Moisture-proof   | Neoprene           |
| MIL-C-24217                           | ALL                              | High Pressure Bulkhead                  | Submersible      | Silicone           |
| MIL-C-25955                           | –                                | Environmental                           | Moisture-proof   | Neoprene           |
|                                       | –                                | Hermetic                                | Moisture-proof   | Neoprene           |
| MIL-DTL-26482 Series 1 Solder (IPT)   | E                                | Environmental with Grommet Nut          | Moisture-proof   | Neoprene           |
|                                       | F                                | Environmental with Strain Relief        | Moisture-proof   | Neoprene           |
|                                       | H*A*                             | Hermetic                                | Moisture-proof   |                    |
|                                       | H*B*                             | Hermetic                                | Moisture-proof   |                    |
|                                       | H*C*                             | Hermetic                                | Moisture-proof   |                    |
|                                       | H*Y*                             | Hermetic                                | Moisture-proof   |                    |
|                                       | J                                | Environmental Gland Seal                | Moisture-proof   | Neoprene           |
| P                                     | Environmental Potting Seal       | Moisture-proof                          | Neoprene         |                    |
| MIL-DTL-26482 Series 1 Crimp (IPT SE) | E                                | Environmental with Grommet Nut          | Moisture-proof   | Neoprene           |
|                                       | F                                | Environmental with Strain Relief        | Moisture-proof   | Neoprene           |
|                                       | P                                | Environmental Potting Seal              | Moisture-proof   | Neoprene           |
| MIL-DTL-26482                         | A                                | Environmental                           | Submersible      | Silicone           |
|                                       | E                                | Environmental                           | Submersible      | Silicone           |
|                                       | H*A*                             | Hermetic                                | Submersible      | Silicone           |
|                                       | H*B*                             | Hermetic                                | Submersible      | Silicone           |
|                                       | H*C*                             | Hermetic                                | Submersible      | Silicone           |
|                                       | H*Y*                             | Hermetic                                | Submersible      | Silicone           |
|                                       | L                                | Environmental                           | Submersible      | Silicone           |
|                                       | N                                | Hermetic                                | Submersible      | Silicone           |
|                                       | W                                | Environmental                           | Submersible      | Silicone           |
| MIL-DTL-26500                         | E                                | Environmental, High Temperature         | Splash-proof     | Silicone           |
|                                       | F                                | Environmental, Fluid Resistant          | Submersible      | Silicone           |
|                                       | G                                | Environmental, Grounding                | Splash-proof     | Silicone           |
|                                       | H*C                              | Hermetic                                | Splash-proof     | Silicone           |
|                                       | H*E                              | Hermetic                                | Splash-proof     | Silicone           |
|                                       | K                                | Environmental, Firewall                 | Splash-proof     | Silicone           |
|                                       | R                                | Environmental                           | Splash-proof     | Silicone           |



|                |                  | CONTACT TYPE |      |                           | SHELL           |                    |                       |
|----------------|------------------|--------------|------|---------------------------|-----------------|--------------------|-----------------------|
| OPERATING TEMP | SOLDER or EYELET | CRIMP        |      | SIZE                      | SHELL MATERIAL  | FINISH DESCRIPTION | COUPLING TYPE         |
|                |                  | FRONT        | REAR |                           |                 |                    |                       |
| 125°C          | •                | –            | –    | 16<br>12<br>8<br>4<br>1/0 | Aluminum        | 500 hr Cad O.D     | Threaded Double Start |
| 125°C          | –                | –            | –    |                           | Aluminum        | Black Anodize      |                       |
| 125°C          | –                | –            | –    |                           | Aluminum        | 500 hr Cad O.D.    |                       |
| 125°C          | –                | –            | –    |                           | Aluminum        | Black Anodize      |                       |
| 125°C          | –                | –            | –    |                           | Aluminum        | 500 hr Cad O.D.    |                       |
| 125°C          | –                | –            | –    |                           | Aluminum        | Black Anodize      |                       |
| 125°C          | •                |              |      | 6<br>4<br>2<br>1/0        | Aluminum        | 500 hr Cad O.D.    | Threaded Double Start |
| 125°C          | •                |              |      | 1/0<br>4/0                | Aluminum        | Black Anodize      |                       |
| 75C            | •                | –            | –    | 16<br>12<br>8<br>4<br>1/0 | Stainless Steel | Passivated         | Coupling              |
| 125°C          | –                | •            | –    | 20                        | Aluminum        | Cadmium            | Threaded Double Start |
| 125°C          | •                | –            | –    |                           | Carbon Steel    | Tinned             |                       |
| 125°C          | •                | –            | –    | 20<br>16<br>12            | Aluminum        | 96 hr Cad O.D.     | Bayonet               |
| 125°C          | •                | –            | –    |                           | Aluminum        | 96 hr Cad O.D.     |                       |
| 125°C          | •                |              |      |                           | Stainless Steel | Passivate          |                       |
| 125°C          | •                |              |      |                           | Stainless Steel | Passivate          |                       |
| 125°C          | •                |              |      |                           | Carbon Steel    | Tinned             |                       |
| 125°C          | •                |              |      |                           | Carbon Steel    | Tinned             |                       |
| 125°C          | •                |              |      |                           | Aluminum        | 96 hr Cad O.D.     |                       |
| 125°C          | •                |              |      |                           | Aluminum        | 96 hr Cad O.D.     |                       |
| 125°C          | –                | •            | –    | 20                        | Aluminum        | 96 hr Cad O.D.     | Bayonet               |
| 125°C          | –                | •            | –    | 16                        | Aluminum        | 96 hr Cad O.D.     |                       |
| 125°C          | –                | •            | –    | 12                        | Aluminum        | 96 hr Cad O.D.     |                       |
| 200°C          | –                | –            | •    | 20<br>16<br>12            | Aluminum        | Black Anodize      | Bayonet               |
| 175°C          |                  |              |      |                           | Aluminum        | Electroless Nickel |                       |
| 200°C          | •                | –            | –    |                           | Stainless Steel | Passivate          |                       |
| 200°C          | •                | –            | –    |                           | Stainless Steel | Passivate          |                       |
| 175°C          | •                | –            | –    |                           | Carbon Steel    | Tinned             |                       |
| 175°C          | •                | –            | –    |                           | Carbon Steel    | Tinned             |                       |
| 200°C          | –                | –            | •    |                           | Aluminum        | Electroless Nickel |                       |
| 175°C          | –                | –            | •    |                           | Carbon Steel    | Tinned             |                       |
| 175°C          | –                | –            | •    |                           | Aluminum        | 500 hr Cad O.D.    |                       |
| 200°C          | –                | •            | –    |                           | 20<br>16<br>12  | Stainless Steel    |                       |
| 175°C          | –                | •            | –    | Aluminum                  |                 | Anodic Coating     |                       |
| 200°C          | –                | •            | –    | Aluminum                  |                 | Electroless Nickel |                       |
| 200°C          | •                | –            | –    | Carbon Steel              |                 | Tinned             |                       |
| 200°C          | •                | –            | –    | Carbon Steel              |                 | Tinned             |                       |
| 200°C          | –                | •            | –    | Stainless Steel           |                 | Passivate          |                       |
| 175°C          | –                | •            | –    | Aluminum                  | Black Anodize   |                    |                       |

# Military Specification Comparison Tables (continued)

| MILITARY SPECIFICATION   | ENVIRONMENTAL AND MATERIAL CLASS | PERFORMANCE                           |                  |                            |
|--|----------------------------------|---------------------------------------|------------------|----------------------------|
|  |                                  | DESCRIPTION                           | WATER RESISTANCE | RESILIENT MATERIAL         |
| MIL-DTL-27599<br>Series I  | P*A                              | Potting Seal                          | –                | None                       |
|  | P*B                              | Potting Seal                          | –                | None                       |
|  | T*A                              | Non-Environmental                     | –                | None                       |
|  | T*B                              | Non-Environmental                     | –                | None                       |
| MIL-DTL-27599<br>Series II   | P*A                              | Potting Seal                          | –                | None                       |
|  | P*B                              | Potting Seal                          | –                | None                       |
|  | T*A                              | Non-Environmental                     | –                | None                       |
|  | T*B                              | Non-Environmental                     | –                | None                       |
| MIL-DTL-28840  | D                                | Environmental                         | Splash-proof     | Fluorosilicone             |
|  | DS                               | Environmental                         | Splash-proof     | Fluorosilicone             |
|  | T                                | Environmental                         | Splash-proof     | Fluorosilicone             |
|  | Z                                | Environmental                         | Splash-proof     | Fluorosilicone             |
| MIL-C-28876  | ALL                              | Environmental                         | Submersible      | Fluorosilicone             |
| SAE AS29600<br>Series A<br>MIL-DTL-38999 Insert                                      | E                                | Environmental                         | Submersible      | Silicone                   |
|  | G                                | Environmental, Space Grade            | Submersible      | Silicone                   |
|  | R                                | Environmental                         | Submersible      | Silicone                   |
| SAE AS29600<br>Series B<br>MIL-C-81511 Insert  | E                                | Environmental                         | Submersible      | Silicone                   |
|  | G                                | Environmental, Space Grade            | Submersible      | Silicone                   |
|  | R                                | Environmental                         | Submersible      | Silicone                   |
| MIL-DTL-38999<br>Series I Scoop Proof<br>and<br>Series II Low Profile<br>(231 & 232) | E                                | Environmental (Superseded by Class T) | Submersible      | Silicone or Fluorosilicone |
|  | G                                | Environmental, Space Grade            | Submersible      | Silicone or Fluorosilicone |
|  | H                                | Hermetically Sealed - Space Grade     | Submersible      | Silicone or Fluorosilicone |
|  | P                                | Environmental with Potting Seal       | Submersible      | Silicone or Fluorosilicone |
|  | T                                | Environmental with Accessory Threads  | Submersible      | Silicone or Fluorosilicone |
|  | Y                                | Hermetic                              | Submersible      | Silicone or Fluorosilicone |

|  | OPERATING TEMP | CONTACT TYPE     |             |      | SIZE           | SHELL                     |   | COUPLING TYPE         |
|--|----------------|------------------|-------------|------|----------------|---------------------------|---|-----------------------|
|  |                | SOLDER or EYELET | CRIMP       |      |                | SHELL MATERIAL            | FINISH DESCRIPTION                                |                       |
|  |                |                  | FRONT       | REAR |                |                           |   |                       |
|  | 150°C          | •                |             |      | 22M            | Aluminum                  | Bright/Gold Cad over Nickel                       | Bayonet               |
|  | 150°C          | •                |             |      | 22D            | Aluminum                  | Bright/Gold Cad over Nickel                       |                       |
|  | 175°C          | •                |             |      | 20             | Aluminum                  | 500 hr Cad O.D.                                   |                       |
|  | 175°C          | •                |             |      | 16<br>12       | Aluminum                  | 500 hr Cad O.D.                                   |                       |
|  | 150°C          | •                |             |      | 22M            | Aluminum                  | Bright/Gold Cad over Nickel                       | Bayonet               |
|  | 150°C          | •                |             |      | 22D            | Aluminum                  | Bright/Gold Cad over Nickel                       |                       |
|  | 175°C          | •                |             |      | 20             | Aluminum                  | 500 hr Cad O.D.                                   |                       |
|  | 175°C          | •                |             |      | 16<br>12       | Aluminum                  | 500 hr Cad O.D.                                   |                       |
|  | 175°C          |                  | •           |      | 20             | Aluminum                  | 500 hr Cad O.D. over Nickel                       | Threaded Double Start |
|  | 175°C          |                  | •           |      |                | Stainless Steel           | Stainless Steel, Cadmium-Black over Nickel        |                       |
|  | 175°C          |                  | •           |      |                | Aluminum                  | Nickel PTFE                                       |                       |
|  | 175°C          |                  | •           |      |                | Aluminum                  | Black Zinc Nickel                                 |                       |
|  | 65°C           |                  | Fiber Optic |      | –              | Aluminum                  | 500 hr Cad O.D.                                   | Threaded              |
|  | 175°C          | •                |             |      | 22D            | Composite                 | None  | Threaded Triple Start |
|  | 175°C          | •                |             |      | 22             | Composite                 | Tin   |                       |
|  | 175°C          | •                |             |      | 20<br>16<br>12 | Composite                 | Tin   |                       |
|  | 175°C          |                  |             | •    | 23             | Composite                 | None  | Threaded Triple Start |
|  | 175°C          |                  |             | •    | 20             | Composite                 | Tin   |                       |
|  | 175°C          |                  |             | •    | 16<br>12       | Composite                 | Tin   |                       |
|  | 150°C-200°C    |                  |             | •    | 22M            | Aluminum                  | See MIL-DTL-38999 Series I Plating Tables page 56 | Bayonet               |
|  | 150°C-200°C    |                  |             | •    | 22D            | Aluminum                  |   |                       |
|  | 150°C-200°C    | •                |             |      | 22             | Carbon or Stainless Steel |   |                       |
|  | 150°C-200°C    |                  |             | •    | 16             | Aluminum                  |   |                       |
|  | 150°C-200°C    |                  |             | •    | 12             | Aluminum                  |   |                       |
|  | 150°C-200°C    |                  |             | •    | 10             | Carbon or Stainless Steel |   |                       |
|  | 150°C-200°C    | •                |             |      | 8              | Carbon or Stainless Steel |   |                       |



# Military Specification Comparison Tables (continued)

| MILITARY SPECIFICATION   | ENVIRONMENTAL AND MATERIAL CLASS  | PERFORMANCE                       |                            |                            |
|--|-----------------------------------|-----------------------------------|----------------------------|----------------------------|
|  |                                   | DESCRIPTION                       | WATER RESISTANCE           | RESILIENT MATERIAL         |
| MIL-DTL-38999<br>Series III Scoop Proof<br>and<br>Series IV Scoop Proof<br>(233 & 234) | C                                 | Environmental Nonconductive       | Submersible                | Silicone or Fluorosilicone |
|  | F                                 | Environmental Conductive          | Submersible                | Silicone or Fluorosilicone |
|  | G                                 | Environmental, Space Grade        | Submersible                | Silicone or Fluorosilicone |
|  | H                                 | Hermetic, Space Grade             | Submersible                | Silicone or Fluorosilicone |
|  | J                                 | Environmental Composite           | Submersible                | Silicone or Fluorosilicone |
|  | K                                 | Environmental, Firewall           | Submersible                | Silicone or Fluorosilicone |
|  | L                                 | Environmental, Stainless          | Submersible                | Silicone or Fluorosilicone |
|  | M                                 | Environmental, Composite          | Submersible                | Silicone or Fluorosilicone |
|  | N                                 | Hermetic                          | Submersible                | Silicone or Fluorosilicone |
|  | P                                 | Environmental, Alumiplate         | Submersible                | Silicone or Fluorosilicone |
|  | R                                 | Environmental Corrosion Resistant | Submersible                | Silicone or Fluorosilicone |
|  | S                                 | Environmental Firewall            | Submersible                | Silicone or Fluorosilicone |
|  | T                                 | Environmental Nickel PTFE         | Submersible                | Silicone or Fluorosilicone |
|  | W                                 | Environmental                     | Submersible                | Silicone or Fluorosilicone |
|  | X                                 | Environmental Corrosion Resistant | Submersible                | Silicone or Fluorosilicone |
| Y  | Hermetic                          | Submersible                       | Silicone or Fluorosilicone |                            |
| Z  | Environmental Zinc Nickel Plating | Submersible                       | Silicone or Fluorosilicone |                            |
| MIL-C-55116  | –                                 | Environmental, Cable Seal         | Splash-proof               | Neoprene                   |
| MIL-C-55181  | –                                 | Environmental, Cable Seal         | Splash-proof               | Neoprene                   |
| MIL-C-55243  | –                                 | Environmental, Cable Seal         | Splash-proof               | Neoprene                   |
| MIL-C-81511 Series1<br>Gang Release*<br>Superseded by<br>Series III                    | A                                 | Environmental                     | Submersible                | Silicone                   |
|  | E                                 | Environmental                     | Splash-proof               | Silicone                   |
|  | F                                 | Environmental                     | Submersible                | Silicone                   |
|  | H                                 | Hermetic                          | Submersible                | Silicone                   |
| MIL-C-81511 Series<br>2 Gang Release*<br>Superseded by<br>Series IV                    | A                                 | Environmental                     | Submersible                | Silicone                   |
|  | E                                 | Environmental                     | Splash-proof               | Silicone                   |
|  | F                                 | Environmental                     | Submersible                | Silicone                   |
|  | H                                 | Hermetic                          | Submersible                | Silicone                   |
| MIL-C-81511<br>Series III  | A                                 | Environmental                     | Submersible                | Silicone                   |
|  | D                                 | Hermetic                          | Submersible                | Silicone                   |
|  | F                                 | Environmental                     | Submersible                | Silicone                   |
|  | W                                 | Environmental                     | Submersible                | Silicone                   |
| MIL-C-81511<br>Series IV   | A                                 | Environmental                     | Submersible                | Silicone                   |
|  | D                                 | Hermetic                          | Submersible                | Silicone                   |
|  | F                                 | Environmental                     | Submersible                | Silicone                   |
|  | W                                 | Environmental                     | Submersible                | Silicone                   |
| SAE-AS81703<br>Series I  | E                                 | Environmental                     | Splash-proof               | Neoprene                   |
|  | H                                 | Hermetic                          | Splash-proof               | Neoprene                   |
|  | J                                 | Gland Seal                        | Splash-proof               | Neoprene                   |
|  | P                                 | Environmental, Potting Seal       | Splash-proof               | Neoprene                   |
| SAE-AS81703<br>Series II   | E                                 | Environmental                     | Splash-proof               | Neoprene                   |
|  | J                                 | Gland Seal                        | Splash-proof               | Neoprene                   |

|                |                  | CONTACT TYPE |      |      | SHELL           |                        |                       |                                |
|----------------|------------------|--------------|------|------|-----------------|------------------------|-----------------------|--------------------------------|
| OPERATING TEMP | SOLDER or EYELET | CRIMP        |      | SIZE | SHELL MATERIAL  | FINISH DESCRIPTION     | COUPLING TYPE         |                                |
|                |                  | FRONT        | REAR |      |                 |                        |                       |                                |
| 200°C          |                  |              | •    | 22M  | Aluminum        | Anodic (nonconductive) | Threaded Triple Start |                                |
| 200°C          |                  |              | •    |      | Aluminum        | Electroless Nickel     |                       |                                |
| 200°C          |                  |              | •    |      | Aluminum        | Electroless Nickel     |                       |                                |
| 200°C          | •                |              |      |      | Stainless Steel | Electroless Nickel     |                       |                                |
| 175°C          |                  |              | •    |      | Composite       | 2000 hr Salt Spray     |                       |                                |
| 200°C          |                  |              | •    |      | Stainless Steel | Passivated             |                       |                                |
| 200°C          |                  |              | •    |      | 22D             | Stainless Steel        |                       | Electroless Nickel             |
| 200°C          |                  |              | •    |      | 22              | Composite              |                       | Electroless Nickel             |
| 200°C          | •                |              |      |      | 20              | Stainless Steel        |                       | Electro deposited Nickel       |
| 175°C          |                  |              | •    |      | 16              | Aluminum               |                       | Pure Electrodeposited Aluminum |
| 200°C          |                  |              | •    |      | 10              | Aluminum               |                       | Electroless Nickel             |
| 200°C          |                  |              | •    |      | 8               | Stainless Steel        |                       | Electro deposited Nickel       |
| 175°C          |                  |              | •    |      |                 | Aluminum               |                       | Nickel PTFE                    |
| 175°C          |                  |              | •    |      |                 | Aluminum               |                       | 500 hr Cad O.D.                |
| 175°C          |                  |              | •    |      |                 | Aluminum               |                       | Corrosion Resistant Cad O.D.   |
| 200°C          | •                |              |      |      |                 | Stainless Steel        |                       | Electroless Nickel             |
| 175°C          |                  |              | •    |      | Aluminum        | Conductive Zinc Nickel |                       |                                |
| 125°C          | •                |              |      | 20   | Stainless Steel | Passivated             | Reverse Bayonet       |                                |
| 125°C          | •                |              |      |      | Carbon Steel    | 96 hr Cad O.D.         | Center Lock Screw     |                                |
| 125°C          | •                |              |      |      | Aluminum        | 96 hr Cad O.D.         | Reverse Bayonet       |                                |
| 200°C          |                  |              | •    | 23   | Aluminum        | Electroless Nickel     | Bayonet               |                                |
| 150°C          |                  |              | *    | 20   | Aluminum        | 96 hr Cad O.D.         |                       |                                |
| 175°C          |                  |              | •    | 16   | Aluminum        | Electroless Nickel     |                       |                                |
| 150°C          | *                |              |      | 12   | Carbon Steel    | Tinned                 |                       |                                |
| 200°C          |                  |              | *    | 23   | Aluminum        | Electroless Nickel     | Bayonet               |                                |
| 150°C          |                  |              | *    | 20   | Aluminum        | 96 hr Cad O.D.         |                       |                                |
| 175°C          |                  |              | *    | 16   | Aluminum        | Electroless Nickel     |                       |                                |
| 150°C          | •                |              |      | 12   | Carbon Steel    | Tinned                 |                       |                                |
| 200°C          |                  |              | •    | 23   | Aluminum        | Electroless Nickel     | Bayonet               |                                |
| 175°C          | •                |              |      | 20   | Stainless       | Passivated             |                       |                                |
| 175°C          |                  |              | •    | 16   | Aluminum        | Electroless Nickel     |                       |                                |
| 175°C          |                  |              | •    | 12   | Aluminum        | 500 hr Cad O.D.        |                       |                                |
| 200°C          |                  |              | •    | 23   | Aluminum        | Electroless Nickel     | Bayonet               |                                |
| 175°C          | •                |              |      | 20   | Carbon Steel    | Passivated             |                       |                                |
| 175°C          |                  |              | •    | 16   | Aluminum        | Electroless Nickel     |                       |                                |
| 175°C          |                  |              | •    | 12   | Aluminum        | 500 hr Cad O.D.        |                       |                                |
| 125°C          | •                |              |      | 20   | Aluminum        | 96 hr Cad O.D.         | Push Pull             |                                |
| 125°C          | •                |              |      |      | Carbon Steel    | Tinned                 |                       |                                |
| 125°C          | •                |              |      |      | 16              | Aluminum               |                       | 96 hr Cad O.D.                 |
| 125°C          | •                |              |      |      | 12              | Aluminum               |                       | 96 hr Cad O.D.                 |
| 175°C          |                  |              | •    | 20   | Aluminum        | 96 hr Cad O.D.         | Push Pull             |                                |
| 175°C          |                  |              | •    | 16   |                 |                        |                       |                                |
| 175°C          |                  |              | •    | 12   | Aluminum        | 96 hr Cad O.D.         |                       |                                |

# Military Specification Comparison Tables (continued)

| MILITARY SPECIFICATION  | ENVIRONMENTAL AND MATERIAL CLASS | PERFORMANCE             |                  |                    |
|---|----------------------------------|-------------------------|------------------|--------------------|
|   |                                  | DESCRIPTION             | WATER RESISTANCE | RESILIENT MATERIAL |
| SAE-AS81703<br>Series III   | E                                | Environmental           | Submersible      | Silicone           |
|   | H                                | Hermetic                | Submersible      | Silicone           |
|   | L                                | Environmental           | Submersible      | Silicone           |
|   | N                                | Hermetic                | Submersible      | Silicone           |
| MIL-C-83526<br>Fiber Optic  | ALL                              | Environmental           | Submersible      | Aluminum           |
| MIL-DTL-83723<br>Series II<br>(Inactive for<br>new design)          | A                                | Environmental           | Submersible      | Silicone           |
|   | G                                | Environmental           | Submersible      | Silicone           |
|   | H                                | Hermetic                | Splash-proof     | Silicone           |
|   | J                                | Hermetic                | Submersible      | Silicone           |
|   | K                                | Environmental, Firewall | Submersible      | Silicone           |
|   | L                                | Hermetic                | Submersible      | Silicone           |
|   | M                                | Environmental           | Submersible      | Silicone           |
|   | N                                | Hermetic, Firewall      | Submersible      | Silicone           |
|   | P                                | Hermetic                | Submersible      | Silicone           |
|   | R                                | Environmental           | Submersible      | Silicone           |
|   | S                                | Environmental, Firewall | Submersible      | Silicone           |
|   | T                                | Environmental           | Submersible      | Silicone           |
|   | W                                | Environmental           | Submersible      | Silicone           |
|   | Y                                | Hermetic                | Submersible      | Silicone           |
| Z   | Environmental                    | Submersible             | Silicone         |                    |
| MIL-DTL-83723<br>Series III<br>Type B Bayonet or<br>Type T Threaded | A                                | Environmental           | Submersible      | Silicone           |
|   | G                                | Environmental           | Submersible      | Silicone           |
|   | H                                | Hermetic                | Splash-proof     | Silicone           |
|   | J                                | Hermetic                | Submersible      | Silicone           |
|   | K                                | Environmental, Firewall | Submersible      | Silicone           |
|   | L                                | Hermetic                | Submersible      | Silicone           |
|   | M                                | Environmental           | Submersible      | Silicone           |
|   | N                                | Hermetic, Firewall      | Submersible      | Silicone           |
|   | P                                | Hermetic                | Submersible      | Silicone           |
|   | R                                | Environmental           | Submersible      | Silicone           |
|   | S                                | Environmental, Firewall | Submersible      | Silicone           |
|   | T                                | Environmental           | Submersible      | Silicone           |
|   | W                                | Environmental           | Submersible      | Silicone           |
|   | Y                                | Hermetic                | Submersible      | Silicone           |
| Z   | Environmental                    | Submersible             | Silicone         |                    |



|  |                | CONTACT TYPE     |       |      | SHELL                     |                            |                            |               |                     |
|--|----------------|------------------|-------|------|---------------------------|----------------------------|----------------------------|---------------|---------------------|
|  | OPERATING TEMP | SOLDER or EYELET | CRIMP |      | SIZE                      | SHELL MATERIAL             | FINISH DESCRIPTION         | COUPLING TYPE |                     |
|  |                |                  | FRONT | REAR |                           |                            |                            |               |                     |
|  | 200°C          |                  |       | •    | 20<br>16<br>12            | Aluminum                   | 500 hr Cad O.D.            | Push Pull     |                     |
|  | 200°C          | •                |       |      |                           | Stainless Steel            | Passivated                 |               |                     |
|  | 175°C          |                  |       | •    |                           | Aluminum                   | 500 hr Cad O.D.            |               |                     |
|  | 200°C          |                  |       | •    |                           | Stainless Steel            | Passivated                 |               |                     |
|  | 65C            | Fiber Optic      |       |      | –                         | Aluminum                   | Grey Anodize               | Threaded      |                     |
|  | 200°C          |                  |       | •    | 16<br>12<br>8<br>4<br>1/0 | Aluminum                   | Black Anodized             | Threaded      |                     |
|  | 200°C          |                  |       | •    |                           | Stainless Steel            | Passivated                 |               |                     |
|  | 150°C          | •                |       |      |                           | Carbon Steel               | Tinned                     |               |                     |
|  | 150°C          | •                |       |      |                           | Carbon Steel               | Tinned                     |               |                     |
|  | 200°C          |                  |       | •    |                           | Stainless Steel            | Passivated                 |               |                     |
|  | 200°C          | •                |       |      |                           | Stainless Steel            | Electrodeposited Nickel    |               |                     |
|  | 175°C          |                  |       | •    |                           | Aluminum                   | Electrodeposited Aluminum  |               |                     |
|  | 200°C          | •                |       |      |                           | Stainless Steel            | Electrodeposited Nickel    |               |                     |
|  | 200°C          | •                |       |      |                           | Aluminum                   | Electronless Nickel        |               |                     |
|  | 200°C          |                  |       | •    |                           | Stainless Steel            | Passivated                 |               |                     |
|  | 175°C          |                  |       | •    |                           | Aluminum                   | Nickel PTFE                |               |                     |
|  | 175°C          |                  |       | •    |                           | Aluminum                   | 500 Hr. Conductive Cadmium |               |                     |
|  | 200°C          | •                |       |      |                           | Stainless Steel            | Passivated                 |               |                     |
|  | 175°C          |                  |       | •    |                           | Aluminum                   | Conductive Zinc Nickel     |               |                     |
|  | 200°C          |                  |       | •    |                           | Aluminum                   | Black Anodized             |               | Bayonet or Threaded |
|  | 200°C          |                  |       | •    |                           | Stainless Steel            | Passivated                 |               |                     |
|  | 150°C          | •                |       |      | Carbon Steel              | Tinned                     |                            |               |                     |
|  | 150°C          | •                |       |      | Carbon Steel              | Tinned                     |                            |               |                     |
|  | 200°C          |                  |       | •    | Stainless Steel           | Passivated                 |                            |               |                     |
|  | 200°C          | •                |       |      | Stainless Steel           | Electrodeposited Nickel    |                            |               |                     |
|  | 175°C          |                  |       | •    | Aluminum                  | Electrodeposited Aluminum  |                            |               |                     |
|  | 200°C          | •                |       |      | Stainless Steel           | Electrodeposited Nickel    |                            |               |                     |
|  | 200°C          | •                |       |      | Stainless Steel           | Passivated                 |                            |               |                     |
|  | 200°C          |                  |       | •    | Aluminum                  | Electronless Nickel        |                            |               |                     |
|  | 200°C          |                  |       | •    | Stainless Steel           | Passivated                 |                            |               |                     |
|  | 175°C          |                  |       | •    | Aluminum                  | Nickel PTFE                |                            |               |                     |
|  | 175°C          |                  |       | •    | Aluminum                  | 500 Hr. Conductive Cadmium |                            |               |                     |
|  | 200°C          | •                |       |      | Stainless Steel           | Passivated                 |                            |               |                     |
|  | 175°C          |                  |       | •    | Aluminum                  | Conductive Zinc Nickel     |                            |               |                     |

# Glenair Sav-Con® Connector Savers: The **Smart Solution** for Preventing Contact Damage and Extending the Service Life of Cable and Box Assemblies



- For MIL-DTL-26482, MIL-DTL-83723, MIL-C-5015, MIL-DTL-38999 Series I, II and III Connectors
- All Standard Materials and Finish Platings
- Environmental and Hermetic Designs Available
- Gender Changers
- Optional Locking Mechanism
- Keyed Polarization
- Fully Repairable

| Sav-Con® Connector Index |         |             |
|--------------------------|---------|-------------|
| Connector Specification  | Series  | Part Number |
| MIL-STD-1533             |         |             |
| MIL-STD-1760             |         | 94*-021     |
| MIL-C-5015               |         | 94*-011     |
| MIL-DTL-26482            | I-II    | 94*-001     |
| MIL-C-28840              |         | 94*-002     |
| MIL-DTL-38999            | I       | 94*-003     |
| MIL-DTL-38999            | II      | 94*-004     |
| MIL-DTL-38999            | III     | 94*-005     |
| MIL-DTL-83723            | I       |             |
| MIL-DTL-83723            | IIIB    | 94*-006     |
| MIL-DTL-83723            | IIIT    | 94*-007     |
| MIL-DTL-83723            |         |             |
| 40M38277                 |         |             |
| 40M38298                 |         | 94*-010     |
| 40M39569                 |         |             |
| LN29504                  |         |             |
| LN 29729 (SJT)           |         | 94*-001     |
| PAN6432-1                |         |             |
| PAN6433-1                |         |             |
| PATT 105 - 602           |         | 94*-009     |
| PATT 616                 |         |             |
| NFC C93-422              | HE 301B |             |
| NFC C93-422              | HE 302  |             |
| NFC C93-422              | HE 308  |             |
| NFC C93-422              | HE 309  |             |
| NFC C93-422              | HE 312  |             |
| VG 95328                 |         |             |

\* 0 = General Duty 1 = Environmental 2 = High Reliability

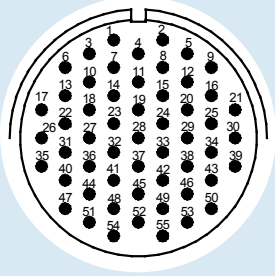
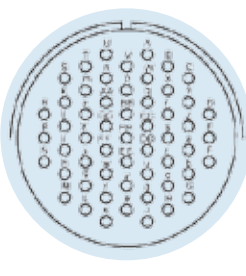
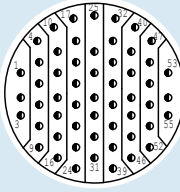
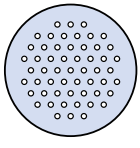
Glenair Sav-Con® Connector Savers are designed to protect connectors that are subject to repeated mating and unmating cycles. Sav-Con® Connector Savers prevent costly repair or replacement of expensive connectors and cables while preserving the quality and integrity of connector performance. Sav-Con® Connector Savers take the abuse of repeated connection cycles instead of “black box” or other equipment connectors. Equipment connectors that are mated and unmated frequently during manufacturing, check-out phases and environmental test programs can be protected by Glenair Sav-Con® Connector Savers at considerable savings in time and money.

Glenair Sav-Con® Connector Savers feature one-piece, non-removable pin/socket contacts for maximum reliability and minimum effect on circuit resistance. Each Glenair

Sav-Con® Connector Saver series meets the same durability requirements as the Military Specification series with which it mates. The mating portions of the pin-and-socket contacts are in strict compliance with the applicable Military Specification contacts used in each connector series. The one-piece design adds resistance to a circuit equal to a mated pin and socket contact, thus it has little or no effect on sensitive circuits.

When a Sav-Con® Connector Saver is installed between a receptacle and a plug, the effective additional length is less than the length of an equivalent mated plug and receptacle. When using bayonet coupled Sav-Con® Connector Savers, Glenair recommends our Lock Ring design feature in applications where large cable bundles may induce unwanted stress to the coupling mechanism and potential unwanted contact displacement.

# Center-to-Center Contact Densities in Standard MS Type Cylindrical Connectors

| Standard  | Miniature   | Subminiature  | Ultraminiature   |
|---|---|---|--|
|  <p>MIL-DTL-5015<br/>MIL-DTL-22992<br/>VG95234 (ITS)<br/>MIL-DTL-28840</p> <p>Insert arrangement shown:<br/>24-A55<br/>55 #20 Contacts</p> |  <p>MIL-DTL-26482</p> <p>Insert arrangement shown:<br/>22-55<br/>55 #20 Contacts</p> |  <p>MIL-DTL-38999</p> <p>Insert arrangement shown:<br/>E35<br/>55 #22D Contacts</p> |  <p>Series 80<br/>"Mighty Mouse"</p> <p>Insert arrangement shown:<br/>16-55<br/>55 #23 Contacts</p> |

| TYPE            | Connector Specification     | Insert Arrangement Specification | Shell Size | Number of Contacts | Contact Size | Center-to-Center |
|-----------------|-----------------------------|----------------------------------|------------|--------------------|--------------|------------------|
| Standard        | MIL-DTL-5015                | MIL-STD-1651                     | 48         | 85                 | 16           | 0.241"           |
|                 | MIL-DTL-22992               | MIL-STD-1651                     | 44         | 104                | 16           | 0.193"           |
|                 | VG95234                     | MIL-STD-1651                     | 26         | 52                 | 16           | 0.203"           |
|                 | MIL-DTL-28840               | MIL-STD-1698                     | 33         | 155                | 20           | 0.114"           |
| Miniature       | MIL-DTL-26482               | MIL-STD-1669                     | 24         | 61                 | 20           | 0.135"           |
|                 | MIL-DTL-26500               | MIL-STD-1554                     | 24         | 61                 | 20           | 0.131"           |
|                 | MIL-DTL-83723               | MIL-STD-1554                     | 24         | 61                 | 20           | 0.131"           |
| Subminiature    | MIL-DTL-38999               | MIL-STD-1560                     | 24         | 128                | 22D          | 0.095"           |
| Ultra-miniature | Series 80<br>"Mighty Mouse" |                                  | 23         | 130                | 23           | 0.076"           |


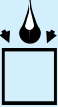
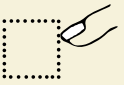

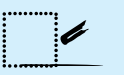



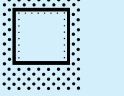

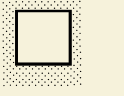





## Examples of Electrical, Mechanical, Environmental and Packaging Modifications to Standard MS Type Connectors

|   |   |   |   |   |  |
|---|---|---|---|---|--|
|    | Integrated Band and Boot Porch                            |    | Non-MS Shielded Contact Choices                   |    | Space Grade Processing and Bakeout               |
|    | Solder or Weld-Mount Flange Modifications                 |    | Unique Coupling Nut Castellations and Coatings    |    | Pure Gas Tube and Pitot Tube Contact Integration |
|    | Splined Accessory Attachment                              |    | High Density Contact Arrangements                 |    | Umbilical Designs with Lanyard Release           |
|    | TBH's Panel Thickness Modifications                       |    | Butt-Joint Fiber Optic Integration                |    | High-Temperature Tolerant Materials              |
|  | Alternative Plating and Material Options (e.g. Composite) |  | Expanded-Beam Fiber Optic Integration             |  | Non-Standard MS Couplings such as Push-Pulls     |
|  | Back Potting for Advanced Environmental Sealing           |  | Auxiliary Ground Spring Integration               |  | Flange Modifications                             |
|  | PC Tail Length and Diameter Modifications                 |  | Center Jackpost and/or Guide Pin Integration      |  | Bulkhead Penetrators                             |
|  | Insertable Solder Pots                                    |  | Gender Changers and Other Unique Connector Savers |  | Overmolded Connectors                            |
|  | Hybrid, Non-Standard Contact Layouts                      |  | Integrated EMI Filtering                          |  | Unique PCB Standoffs                             |
|  | High-Speed and Matched Impedance Layouts                  |  | Integrated EMP Diodes                             |  | O-Ring Equipped Panel and Box Mount Designs      |

# International Standards IP Protection Classification

IEC Publication 60529 Classification of Degrees of Protection by Enclosures provides a system for specifying enclosures of electrical equipment on the basis of the degree of protection required. IEC 60529 does not specify degrees of protection against risk of explosions or conditions such as moisture (produced, for example, by condensation), corrosive vapors, fungus, or vermin. NEMA Standards Publication 250 does test for environmental conditions such as corrosion, rust, icing, oil, and coolants. For this reason, and because the tests and evaluations for other characteristics are not identical, the IEC enclosure classification designations cannot be exactly equated with NEMA enclosure Type numbers.

| First Numeral |   |  | Second Numeral |   |
|---------------|---|--|----------------|---|
| IP            | Protection of Persons   | Protection of Equipment                                      | IP             | Protection of Equipment   |
| 0             | No Protection   | No Protection  | 0              | No Protection   |
| 1             |  Protected against contact with large areas of the body (back of hand) | Protected against objects over 50 mm in diameter             | 1              |  Protected against vertically falling drops of water, e.g. condensation                         |
| 2             |  Protected against contact with fingers                                | Protected against solid objects over 12 mm in diameter       | 2              |  Protected against direct sprays of water up to 15° from vertical                               |
| 3             |  Protected against tools and wires over 2.5 mm in diameter             | Protected against solid objects over 2.5 mm in diameter      | 3              |  Protected against sprays to 60° from vertical  |
| 4             |  Protected against tools and wires over 1 mm in diameter               | Protected against objects over 1 mm in diameter              | 4              |  Protected against water sprayed from all directions (limited ingress permitted)                |
| 5             |  Protected against tools and wires over 1 mm in diameter             | Protected against dust (limited ingress, no harmful deposit) | 5              |  Protected against low pressure jets of water from all directions (limited ingress permitted) |
| 6             |  Protected against tools and wires over 1 mm in diameter             | Totally protected against dust                               | 6              |  Protected against strong jets of water   |
|               |   |  | 7              |  Protected against the effects of immersion between 15 cm and 1 m                             |
|               |   |  | 8              |  Protected against long periods of immersion under pressure                                   |

## Example Rating

| If the 1st IP number is...                     | and the 2nd IP number is...              | Then the IP rating is   |
|--|--|---|
| <b>2</b><br>(protection against solid objects) | <b>3</b><br>(protection against liquids) | <b>IP 2 3</b><br>(Protection against touch with a finger and penetration of solid objects greater than 12 mm and against spraying water.) |

## Levels of Sealing

| Connector Type                | Seal Rating                        | Sealing Method         | Typical Shell Material        | Contact Material           |
|-------------------------------|------------------------------------|------------------------|-------------------------------|----------------------------|
| Dust Tight                    | IP 65                              | Elastomer and/or epoxy | Aluminum or Plastic           | BeCu/Brass/others          |
| Environmental                 | IP 66                              | Elastomer and/or epoxy | Aluminum or Plastic           | BeCu/Brass/others          |
| Environmental                 | IP 67                              | Elastomer and/or epoxy | Aluminum or Plastic           | BeCu/Brass/others          |
| Environmental                 | IP 68                              | Elastomer and/or epoxy | Aluminum or Plastic           | BeCu/Brass/others          |
| Semi-Hermetic (-491 Mod Code) | 1 X 10 <sup>-4</sup> Epoxy Special | Aluminum               | Special                       |                            |
| Hermetic                      | 1 X 10 <sup>-4</sup>               | Glass (soft) to Metal  | Aluminum                      | BeCu/other                 |
| Hermetic                      | 1 X 10 <sup>-6</sup>               | Glass to Metal         | Cold Rolled Steel or Titanium | Alloy 52 or Kovar          |
| Hermetic                      | 1 X 10 <sup>-8</sup>               | Glass to Metal         | Stainless Steel or Kovar      | Alloy 52 or Kovar          |
| Hermetic                      | 1 X 10 <sup>-10</sup>              | Glass to Metal         | Inconel or Stainless Steel    | Inconel or Stainless Steel |

Hermetic leak rate = CC He/Sec

# Six Degrees of Separation:

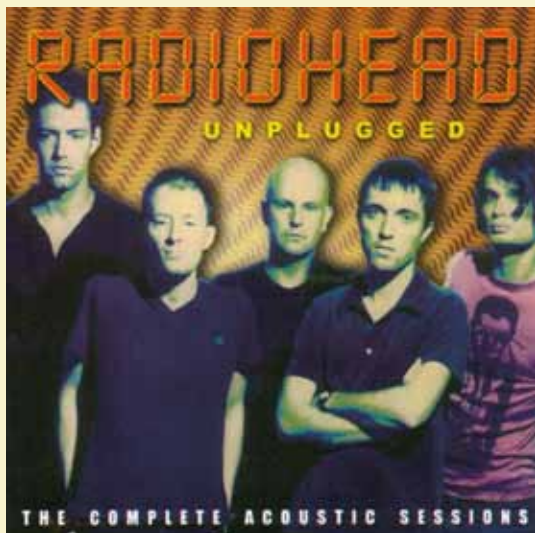
## ELECTRICAL CONNECTORS AND ROCK & ROLL

We love a good challenge. So when *QwikConnect* publisher Chris Toomey (please direct all negative e-mail directly to him) suggested a rock-themed centerfold we jumped at the chance. While some may claim the relationship between the interconnect industry and this slice of the music business is tenuous at best, we will argue otherwise in this authoritative broadside; proving beyond all reasonable doubt that these two seemingly unrelated cultures are in fact—dare we say it—connected at the hip.

# AC/DC



**Fact Number Two:** Phil Spector, the widely successful rock music impresario and celebrity hit-man, holds several important interconnect-industry patents for Electrostatic Discharge (ESD) and lightning-strike products.



**Fact Number One:** Electrical current and rock-and-roll share common origins. Australian brothers Malcolm and Angus Young formed the popular Heavy Metal Rock Band AC/DC in 1973. In an unmistakable homage to the electrical interconnect industry, the brothers named the group after alternating current (AC) in which the movement of electric charge periodically reverses direction, and direct current (DC), in which the flow of electric charge is only in one direction.



**Fact Number**  
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singer Chu K  
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The album, ti  
and touching  
features a ran  
of hits includi  
Chu's signatu  
*Connectors i*  
B-side hit *Be*  
*Bayonet*.

**Fact Number Three:**  
Many rock bands lamely attempt to rebel, to distance themselves from the interconnect industry, (which they decry as painfully “uncool”) by producing special unplugged versions of their songs. Kind of sad really.



(3) Du  
inhaled  
**We can't help**  
**interconnect i**





**Fact Number Five:** The T-Connection: The pinnacle (or perhaps the nadir) of the historical rock-disco-connector industry relationship. The band's name famously relates to a much beloved conduit fitting, or splitter, used on one of their most powerful road amps.

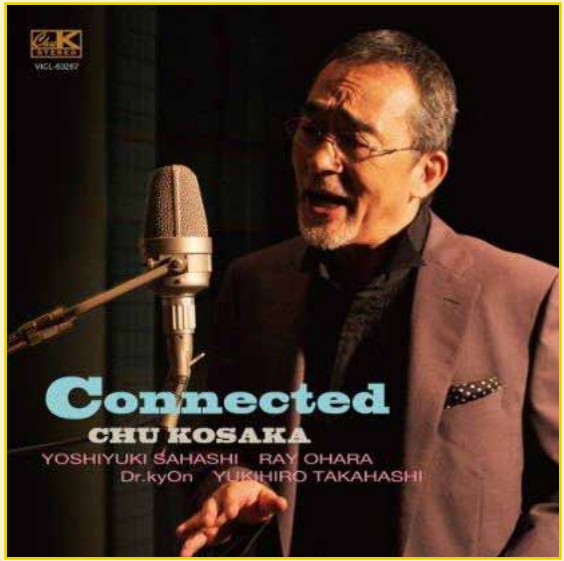


**Fact Number Six:** It should be obvious, but we'll make the point anyway, Tom Petty wrote his hit ballad, *Make That Connection*, with the MIL-DTL-38999 connector in mind. Just check out the song's chorus to see what we mean:

*I want to make that connection,  
that connection to you  
I want to make that connection,  
that connection to you.*

We're pretty sure Tom must be a Series III man, so we've added a little eye-candy to this page just for him. Rock on, Tom!

**r Four:** World-  
nese rock-gospel  
osaka spoke truth  
is landmark tribute  
nnect industry.  
ttled simply  
ly, *Connected*,  
re cavalcade  
ng "Pastor"  
re song *Power*  
n the Sky, and  
*My Reverse*



**And finally, under the heading "Missed Connections" check out these stunning facts:**

- (1) The only guy in ZZ Top who doesn't have a beard is Frank Beard.
  - (2) In 1976 Barry Manilow sang a chart-topping song titled *I Write the Songs*. The song wasn't written by him.
- During a performance in 1994, Ramon Barrero, a Mexican musician famous for playing the world's smallest harmonica, held the harmonica and choked to death on stage.

**but point out that these are precisely the types of ironies we experience almost daily in our beloved industry. In fact, the parallels and connections couldn't be clearer. Your Honor, we rest our case!**





# Cylindrical Connector

## TERMS AND DEFINITIONS

**Back-Mounted:** A connector design used in panel or box applications in which the mounting flange is located inside the equipment enclosure.

**Bayonet Coupling:** A mating design utilizing pins on the receptacle and slots on the plug for quick-connect and disconnect coupling. “Reverse” bayonet puts the pins on the plug and slots on the receptacle.

**Circular Connector:** Any of a thousand flavors of multipin interconnects with cylindrical contact housings and circular contact interface geometries. Circular connectors are selected for ease of engagement and disengagement, their ability to conveniently house different types of contacts, their wide range of allowable contact voltages and currents, their ease of environmental sealing and their rugged mechanical performance. In military and other high-rel applications, the MIL-C-5015 and MIL-DTL-38999 are the most commonly specified types. Note: A disadvantage of the circular design is loss of panel space when used in arrays.

**Closed Entry:** A contact cavity design in which the entry diameter of the socket insulator is smaller than the outside dimension of the socket contact. Closed entry limits the size or position of the mating contact to a maximum dimension.

**Connector Body:** The metal or plastic shell of a connector. Its main purpose is to house the contacts, maintain their position and shield them from dust, dirt, moisture, and electrical interference.

**Coaxial Contacts (and Cable):** A contact with inner and outer conductive elements separated by a center dielectric element. Coaxial contacts terminate coaxial cable, and are employed in high bandwidth, high-frequency applications such as video and audio. The cable offers a closed, controlled impedance medium for the transmission of RF energy. It also provides high frequency performance and RFI shielding.

**Contact:** The conductive element in a connector. Contacts mate mechanically and electrically to transmit signals and/or power across a connector interface.

Crimp style contacts are the most common type found in high-reliability cylindrical connectors. Male contacts are sometimes referred to as leads, posts or pins. Female contacts are universally known as sockets.

**Contact Arrangement or Pattern:** The gauge, number, spacing and arrangement of contacts in a connector. Contact arrangement selections are based on the current and voltage requirements of the application, and the space available for the connector package.

**Contact Engaging and Separating Force:** Tensile force required to engage or separate mating contacts. Measured in ounces, the force increases with contact size.

**Contact (or Circuit) Identifier:** Wiring schematics identify and label each and every circuit with numbers, letters or special codes. On the connector, this process is maintained by marking small numbers or letters next to each contact cavity on the connector.

**Contact Resistance:** The measure of electrical resistance across a pair of fully mated contacts. Measured in ohms or millivolt drop at a specified current, contact resistance is affected by normal force (the static force on the contact interface), plating quality and the physical geometry of the contact.

**Contact Retainer:** A locking clip or tang used to secure a crimp contact in place within the connector insert. Contact retention specifications define the force required to remove a properly seated contact for each class of connector.

**Contact Retention:** The pressure a contact can withstand, in either direction, without being dislodged from the retaining clip which holds it within the connector.

**Contact Size:** An assigned number denoting the outside diameter of the engaging end of the pin contact. The larger the number, the smaller the size.

**Contact Spacing:** Also referred to as pitch, the distance, center-to-center, between adjacent contacts.

**Coupling Ring:** An accessory feature of the connector plug which aids in mating and unmating plugs and receptacles and prevents decoupling of the connector. Self-locking coupling rings are used for high-vibration applications.

**Crimp:** The physical compression (deformation) of a contact barrel around a conductor in order to make an electrical connection.

**Crimp Contact:** A connector pin or socket, shipped loose with the connector body, and designed to be crimped onto the end of the wire conductor with a special tool. Often referred to as “crimp and poke” contacts, the terminated contact is poked into the connector body either by hand, or in the case of small gauge wires, with the aid of a hand-held tool. The ease of assembly and maintenance afforded by crimp contacts is preferred for aerospace and other high reliability applications not requiring a hermetic seal.

**Dielectric:** A material having electrical insulating properties, such as the contact insulator in a connector or the jacketing on a wire.

**Electrical Connector:** A separable device which provides mechanical and electrical contact between two elements of an electronic system without unacceptable signal distortion or power loss.

**Electromagnetic interference** (EMI) is conducted, radiated or magnetically induced voltage that degrades, obstructs, or repeatedly interrupts performance of electronic equipment.

**Environmentally Sealed:** Connectors and backshells designed to prevent fluids, moisture, air or dust from degrading the performance of electrical contacts and conductors. “Environmental” components typically use gaskets, grommets, potting materials or interfacial and O-ring seals to prevent the penetration of foreign substances into the body of the part.

**Filter Contact or Filter Connector:** Contact design which provides EMI suppression in addition to its normal function of transmitting electrical energy. Filtered connectors are typically specified for highspeed signal paths. Filtering is accomplished through the integration of capacitors into the contact to separate high-frequency noise from low-frequency signals.

**Firewall Connector:** A class of high-reliability, feedthrough connectors designed to prevent fire or sparks from penetrating through a sealed bulkhead.

Firewall connectors must continue to function for a specific period of time when exposed to fire, and are typically specified in military applications such as fighter jets and Navy ships.

**Flange:** The integral mounting plate on some bulkhead and feed-through connectors used to attach the connector to the chassis or panel. The connector flange is typically square, and is mounted to the panel with threaded screws.

**Front Mounted:** A connector design used in panel or box applications in which the mounting flange is located on the inside or outside of the equipment enclosure.

**Front Release:** “Crimp and poke” style contacts may be removed from the connector for maintenance using a special hand-held tool. The proper insertion and removal tool must be used at all times. In front release designs, the tool is inserted into the mating face of the connector to disengage the contact from its retaining clip. The disengaged contact is then removed from the back (cable-side) of the connector by lightly pulling on the attached wire.

**Grommet:** An elastomeric seal used on the back side of a connector to seal out fluids, moisture, air and dust.

**Grounding (or EMI) Fingers:** A set of spring fingers in certain connectors, used to facilitate shell to shell grounding and enhance EMI performance. The grounding fingers engage before contact mating and remain engaged until after contact separation.

**Guide Pins:** Metal posts with a rounded or pointed tip which projects beyond the contact interface, used to assist in the correct alignment and mating of connector shells and contacts. The post mates with a corresponding cavity on the mating connector before contacts are allowed to engage. Guide pins are typically used in rack and panel packaging and in other “blind-mate” applications. Guide pins can also be used to insure correct polarization.

**Hermetic Connector:** A class of connectors equipped with a pressure seal for use in maintaining pressurized application environments. The hermetic element of the connector is typically fabricated from vitreous glass.



**Insert:** A molded piece of dielectric material that fits inside the connector shell and supports the connector contacts. Inserts are tooled for each shell size, and contact arrangement. Inserts made from resilient materials also contribute to environmental properties.

**Insulation Displacement:** Forcing an insulated wire into a terminal slot smaller than the conductor diameter, displacing the insulation to make electrical contact.

**Interfacial Seal:** An elastomeric seal providing overall sealing of the mated connectors and their individual contacts. “Cork & bottle” style seals feature a raised shoulder around each pin contact that compresses into a corresponding hole on the socket contact insulator.

**Key:** A short pin (sometimes referred to as a “dog” by crusty old machinists) which slides into a corresponding slot or keyway to guide the plug and receptacle together during mating. The principal function of the key is to insure polarization of the mating contacts.

**Levels of Interconnection:** A classification system for connectors defining connector types in terms of interconnect system function. The levels of most use include Level 4 (subassembly to subassembly), Level 5 (subassembly to I/O) and Level 6 (system to system). The lower levels (1, 2 and 3) all concern interconnection inside the microscopic world of printed circuit boards.

**Mating and Unmating Force:** The force required to join and separate two halves of a connector. This is the sum of contact engaging forces plus any additional force necessary to overcome minor misalignment of connector halves and any dimensional variations in the connector shells.

**Normal Force:** A measure of the spring pressure applied perpendicularly to contacts in mated connectors. The force of this spring pressure creates the gas-tight interface between contact surfaces which prevents corrosive contaminants from penetrating or forming between the contacts. High normal force reduces resistance across the contacts, but contributes to contact wear and may overstress the connector housing and even damage the spring properties of contact sockets. However, maintaining a constant normal force is an essential requirement for electrical integrity in the connector.

**Package Size:** The length, width and height of the connector; or alternatively the dimensions of the entire interconnect system. Package size is an issue in many applications where system miniaturization, faster operating speeds, higher operating temperatures and other application requirements place new demands on the envelope of space the connector and its accessories may occupy.

**Plug:** The half of a connector pair which is designed to attach to a wire or cable; as opposed to the receptacle half which is typically mounted to a bulkhead, panel or box. Even though we usually picture plugs as having male (pin) contacts, they can in fact house any type of contact—pins, sockets or even both. Thus it is the design and location of the connector which makes it a plug, not the gender of its contacts.

**Polarize:** Design features on mating connectors—such as keyways or shell geometries—that insure connectors can be mated in only one possible orientation. The shape of a D-Sub connector shell, for example, assures that the two halves of the connector can be mated in only one way.

**Potting:** The permanent sealing of the cable end of a connector with a compound or material to exclude moisture or to provide a strain relief. Glenair typically uses epoxy compounds for this purpose because of their dimensional stability and high-temperature resistance.

**Radio frequency interference** (RFI) is a type of EMI that occurs between the audio and infrared frequencies in the electromagnetic spectrum. Many natural RF signals exist in nature, but typically RFI is a man-made electromagnetic wave such as might originate in unfiltered electronic circuitry.

**Rear Release:** “Crimp and poke” style contacts (see Crimp Contacts above) may be removed from the connector for maintenance using a special hand-held tool. The proper insertion and removal tool must be used to install and remove wires from such crimp and poke connectors. In rear release designs, the tool is inserted into the rear (cable side) of the connector to disengage the contact from its retaining clip. The disengaged contact is then removed from the connector by lightly pulling on the attached wire.

**Receptacle:** The other half of the connector pair, designed to be mounted—with jam nut fittings or other fastener hardware—to a bulkhead, panel or box.

Inline receptacles are also available for cable-to-cable connections. As with the plug, it is the design and location of the receptacle in the system, not the gender of its contacts, which makes it a receptacle.

**Rectangular Connector:** Any of the thousands of multipin interconnects with rectangular shell housings and rectangular insert interface geometries. Rectangular connectors are typically mounted in rack and panel configurations in which large arrays of fixed receptacle connectors are mated with plugs attached to a movable rack for efficient utilization of space. D-Subminiatures are the world's most common rectangular connectors.

**Scoop-proof:** Scoop-proof connectors feature a nice, long shell on the receptacle which prevents damage to the exposed contact pins during mating. No matter how hard that swabbie tries, it is impossible to cock the mating plug so as to damage the pins or electrically short the contacts.

**Service Rating:** Also called Current Rating, the maximum voltage or current load a connector is designed to carry during continuous, long-term use. Good engineering practice usually entails preliminary testing of connectors which will be operated with most or all contacts at the maximum rated load. Designers will often maximize contact and wire size in such situations.

**Solder Cup:** A connector design that typically uses potting material to permanently affix the contacts inside the connector shell. Termination of contact to wire is then accomplished by soldering the wire into the cup-like barrel on the back of the contact. In the United Kingdom it is important to pronounce the "i" in solder. Brits also prefer to say "bucket" rather than "cup" when specifying solder contacts.

**Standoff** Part of a connector shell, a standoff provides additional working room between the connector shell, and, for example, a printed circuit board

**Surface Mount:** A termination method in which solder "tails" or leads on the connector are soldered directly to a printed circuit board. In high-reliability commercial and military applications, surface mount receptacle connectors are typically limited to rectangular designs such as D-Subminiatures and Micro-D's. But some surface-mount applications do use a cylindrical connector mounted to the box with ribbon cable or flying leads soldered directly to the

PCB. The reason here is to provide a low-resistance pathway to ground of the shielded cable. In severe EMI applications, it is less satisfactory to bring the shielded cable directly to the printed circuit board because of the difficulty in shielding out interference conducted along the cable.

**Termination:** Termination is the physical act of attaching a wire conductor to a contact. Effective termination contributes to electrical performance and to the durability and reliability of the interconnect system. Common termination methods include crimp, insulation displacement, surface mount, and soldering. Termination can also refer to the mechanical attachment of EMI shielding to the connector backshell.

**Threaded Coupling:** An interconnect mating design which utilizes a threaded nut on the plug, and a corresponding set of threads on the receptacle, to mate the pair of components. The coupling nut is usually equipped with flats or knurling for easy assembly. Different thread types, profiles and geometries provide different functionality. "Buttress" threads, for example, are often specified on plastic connectors due to their enhanced tensile strength. The MIL-DTL-38999 Series III connector incorporates a triple-start threaded coupling mechanism for greater vibration protection and faster mating and unmating.

**Wall Mount** A square-flanged receptacle connector in which the mounting flange is located on the outside of the equipment enclosure.

**Wiping Effectiveness:** Maintaining a clean, metallic path is essential if contacts are to perform with low and stable contact resistance. Surface films and contaminants are removed from the surface of plated contacts each time mating occurs. This displacement of surface contaminants during mating is called contact wiping. Wiping effectiveness depends on the contact geometry, engagement length and normal force. Interestingly, oxide film does not form on gold plated contacts, so wiping pressure can be lighter to displace only the occasional surface contaminant.

**Wire Pull-Out Force:** This defines the force required to separate a wire from a contact. In properly terminated crimp contacts, the wire will generally break before it pulls away from the contact.



# AS39029 Crimp Contact Selection Guide

| Military Part Number | Glenair Part Number | Contact Size | Wire Accommodation | Pin / Socket | BIN Color Striping |        |        |
|----------------------|---------------------|--------------|--------------------|--------------|--------------------|--------|--------|
| M39029/56-348        | 850-001-22-348      | 22           | 22-28 AWG          | Socket       | Orange             | Yellow | Grey   |
| M39029/56-351        | 850-001-20-351      | 20           | 20-24 AWG          | Socket       | Orange             | Green  | Brown  |
| M39029/56-352        | 850-001-16-352      | 16           | 16-20 AWG          | Socket       | Orange             | Green  | Red    |
| M39029/56-353        | 850-001-12-353      | 12           | 12-14 AWG          | Socket       | Orange             | Green  | Orange |
| M39029/56-527        | 850-001-10-527      | 10           | 10 AWG             | Socket       | Green              | Red    | Violet |
| M39029/57-354        | 850-003-22-354      | 22           | 22-28 AWG          | Socket       | Orange             | Green  | Yellow |
| M39029/57-357        | 850-003-20-357      | 20           | 20-24 AWG          | Socket       | Orange             | Green  | Violet |
| M39029/57-358        | 850-003-16-358      | 16           | 16-20 AWG          | Socket       | Orange             | Green  | Grey   |
| M39029/57-359        | 850-003-12-359      | 12           | 12-14 AWG          | Socket       | Orange             | Green  | White  |
| M39029/58-360        | 850-002-22-360      | 22           | 22-28 AWG          | Pin          | Orange             | Blue   | Black  |
| M39029/58-363        | 850-002-20-363      | 20           | 20-24 AWG          | Pin          | Orange             | Blue   | Orange |
| M39029/58-364        | 850-002-16-364      | 16           | 16-20 AWG          | Pin          | Orange             | Blue   | Yellow |
| M39029/58-365        | 850-002-12-365      | 12           | 12-14 AWG          | Pin          | Orange             | Blue   | Green  |
| M39029/58-528        | 850-002-10-528      | 10           | 10 AWG             | Pin          | Green              | Red    | Grey   |
| M39029/63-368        | 850-021-20-368      | 20           | 20-24 AWG          | Socket       | Orange             | Blue   | Grey   |
| M39029/64-369        | 850-022-20-369      | 20           | 20-24 AWG          | Pin          | Orange             | Blue   | White  |

| BIN Color Coding |            |          |             |             |            |           |             |           |            |
|------------------|------------|----------|-------------|-------------|------------|-----------|-------------|-----------|------------|
| 0<br>BLACK       | 1<br>BROWN | 2<br>RED | 3<br>ORANGE | 4<br>YELLOW | 5<br>GREEN | 6<br>BLUE | 7<br>VIOLET | 8<br>GREY | 9<br>WHITE |

# AS39029 Crimp Contact Selection Guide

| Military Part Number | Glenair Part Number | Contact Size | Wire Accommodation | Pin / Socket | BIN Color Striping |       |        |
|----------------------|---------------------|--------------|--------------------|--------------|--------------------|-------|--------|
| M39029/83-450        | 850-004-20-450      | 20           | 22-26 AWG          | Pin          | Yellow             | Green | Black  |
| M39029/83-451        | 850-004-20-451      | 20           | 28-32 AWG          | Pin          | Yellow             | Green | Brown  |
| M39029/83-508        | 850-004-20-508      | 20           | 20-24 AWG          | Pin          | Green              | Black | Grey   |
| M39029/84-452        | 850-005-20-452      | 20           | 22-26 AWG          | Socket       | Yellow             | Green | Red    |
| M39029/84-453        | 850-005-20-453      | 20           | 28-32 AWG          | Socket       | Yellow             | Green | Orange |
| M39029/84-509        | 850-005-20-509      | 20           | 20-24 AWG          | Socket       | Green              | Black | White  |
| M39029/106-614       | 850-006-22-614      | 22           | 22-28 AWG          | Socket       | Blue               | Brown | Yellow |
| M39029/106-615       | 850-006-20-615      | 20           | 20-24 AWG          | Socket       | Blue               | Brown | Green  |
| M39029/106-616       | 850-006-16-616      | 16           | 16-20 AWG          | Socket       | Blue               | Brown | Blue   |
| M39029/106-617       | 850-006-12-617      | 12           | 12-14 AWG          | Socket       | Blue               | Brown | Violet |
| M39029/106-618       | 850-006-10-618      | 10           | 10 AWG             | Socket       | Blue               | Brown | Grey   |
| M39029/107-620       | 850-007-22-620      | 22           | 22-28 AWG          | Pin          | Blue               | Red   | Black  |
| M39029/107-621       | 850-007-20-621      | 20           | 20-24 AWG          | Pin          | Blue               | Black | Brown  |
| M39029/107-622       | 850-007-16-622      | 16           | 16-20 AWG          | Pin          | Blue               | Red   | Red    |
| M39029/107-623       | 850-007-12-623      | 12           | 12-14 AWG          | Pin          | Blue               | Red   | Orange |
| M39029/107-624       | 850-007-10-624      | 10           | 10 AWG             | Pin          | Blue               | Red   | Yellow |

| BIN Color Coding |            |          |             |             |            |           |             |           |            |
|------------------|------------|----------|-------------|-------------|------------|-----------|-------------|-----------|------------|
| 0<br>BLACK       | 1<br>BROWN | 2<br>RED | 3<br>ORANGE | 4<br>YELLOW | 5<br>GREEN | 6<br>BLUE | 7<br>VIOLET | 8<br>GREY | 9<br>WHITE |

## AS39029 Shielded Contact Selection Guide

| Military Part Number | Glenair Part Number | Contact Size | Pin / Socket | Type    | BIN Color Striping |       |        |
|----------------------|---------------------|--------------|--------------|---------|--------------------|-------|--------|
| M39029/27-210        | 852-001-12-210      | 12           | Socket       | Coaxial | Red                | Brown | Black  |
| M39029/27-402        | 852-001-12-402      | 12           | Socket       | Coaxial | Yellow             | Black | Red    |
| M39029/27-403        | 852-001-12-403      | 12           | Socket       | Coaxial | Yellow             | Black | Orange |
| M39029/27-404        | 852-001-12-404      | 12           | Socket       | Coaxial | Yellow             | Black | Yellow |
| M39029/27-405        | 852-001-12-405      | 12           | Socket       | Coaxial | Yellow             | Black | Green  |
| M39029/27-406        | 852-001-12-406      | 12           | Socket       | Coaxial | Yellow             | Black | Blue   |
| M39029/27-407        | 852-001-12-407      | 12           | Socket       | Coaxial | Yellow             | Black | Violet |
| M39029/27-408        | 852-001-12-408      | 12           | Socket       | Coaxial | Yellow             | Black | Gray   |
| M39029/28-211        | 852-002-12-211      | 12           | Pin          | Coaxial | Red                | Brown | Brown  |
| M39029/28-409        | 852-002-12-409      | 12           | Pin          | Coaxial | Yellow             | Black | White  |
| M39029/28-410        | 852-002-12-410      | 12           | Pin          | Coaxial | Yellow             | Brown | Black  |
| M39029/28-411        | 852-002-12-411      | 12           | Pin          | Coaxial | Yellow             | Brown | Brown  |
| M39029/28-412        | 852-002-12-412      | 12           | Pin          | Coaxial | Yellow             | Brown | Red    |
| M39029/28-413        | 852-002-12-413      | 12           | Pin          | Coaxial | Yellow             | Brown | Orange |
| M39029/28-414        | 852-002-12-414      | 12           | Pin          | Coaxial | Yellow             | Brown | Yellow |
| M39029/28-415        | 852-002-12-415      | 12           | Pin          | Coaxial | Yellow             | Brown | Green  |
| M39029/59-366        | 852-006-08-366      | 08           | Socket       | Coaxial | Orange             | Blue  | Blue   |
| M39029/60-367        | 852-007-08-367      | 08           | Pin          | Coaxial | Orange             | Blue  | Violet |
| M39029/75-416        | 852-003-12-416      | 12           | Socket       | Coaxial | Yellow             | Brown | Blue   |
| M39029/75-417        | 852-003-12-417      | 12           | Socket       | Coaxial | Yellow             | Brown | Violet |
| M39029/75-418        | 852-003-12-418      | 12           | Socket       | Coaxial | Yellow             | Brown | Gray   |
| M39029/75-419        | 852-003-12-419      | 12           | Socket       | Coaxial | Yellow             | Brown | White  |
| M39029/75-420        | 852-003-12-420      | 12           | Socket       | Coaxial | Yellow             | Red   | Black  |
| M39029/75-421        | 852-003-12-421      | 12           | Socket       | Coaxial | Yellow             | Red   | Brown  |
| M39029/75-422        | 852-003-12-422      | 12           | Socket       | Coaxial | Yellow             | Red   | Red    |
| M39029/75-423        | 852-003-12-423      | 12           | Socket       | Coaxial | Yellow             | Red   | Orange |
| M39029/76-424        | 852-008-16-424      | 16           | Pin          | Coaxial | Yellow             | Red   | Yellow |
| M39029/76-425        | 852-008-16-425      | 16           | Pin          | Coaxial | Yellow             | Red   | Green  |

# AS39029 Shielded Contact Selection Guide

| Military Part Number | Glenair Part Number | Contact Size | Pin / Socket | Type              | BIN Color Striping |         |         |
|----------------------|---------------------|--------------|--------------|-------------------|--------------------|---------|---------|
|                      |                     |              |              |                   | Color 1            | Color 2 | Color 3 |
| M39029/76-426        | 852-008-16-426      | 16           | Pin          | Coaxial           | Yellow             | Red     | Blue    |
| M39029/76-427        | 852-008-16-427      | 16           | Pin          | Coaxial           | Yellow             | Red     | Violet  |
| M39029/77-428        | 852-009-16-428      | 16           | Socket       | Coaxial           | Yellow             | Red     | Gray    |
| M39029/77-429        | 852-009-16-429      | 16           | Socket       | Coaxial           | Yellow             | Red     | White   |
| M39029/77-430        | 852-009-16-430      | 16           | Socket       | Coaxial           | Yellow             | Orange  | Black   |
| M39029/77-431        | 852-009-16-431      | 16           | Socket       | Coaxial           | Yellow             | Orange  | Brown   |
| M39029/78-432        | 852-010-16-432      | 16           | Socket       | Coaxial           | Yellow             | Orange  | Red     |
| M39029/78-433        | 852-010-16-433      | 16           | Socket       | Coaxial           | Yellow             | Orange  | Orange  |
| M39029/78-434        | 852-010-16-434      | 16           | Socket       | Coaxial           | Yellow             | Orange  | Yellow  |
| M39029/78-435        | 852-010-16-435      | 16           | Socket       | Coaxial           | Yellow             | Orange  | Green   |
| M39029/90-529        | 853-001-08-529      | 8            | Pin          | Concentric Twinax | Green              | Red     | White   |
| M39029/91-530        | 853-002-08-530      | 8            | Socket       | Concentric Twinax | Green              | Orange  | Black   |
| M39029/102-558       | 852-004-12-558      | 12           | Pin          | Coaxial           | Green              | Green   | Gray    |
| M39029/103-559       | 852-005-12-559      | 12           | Socket       | Coaxial           | Green              | Green   | White   |
| M39029/113-625       | 853-003-08-625      | 8            | Pin          | Concentric Twinax | Blue               | Red     | Green   |
| M39029/113-626       | 853-003-08-626      | 8            | Pin          | Concentric Twinax | Blue               | Red     | Blue    |
| M39029/114-628       | 853-004-08-628      | 8            | Socket       | Concentric Twinax | Blue               | Red     | Gray    |
| M39029/114-629       | 853-004-08-629      | 8            | Socket       | Concentric Twinax | Blue               | Red     | White   |
| N/A                  | 854-001-01          | 8            | Pin          | Quadrax           | N/A                |         |         |
| N/A                  | 854-001-02          | 8            | Pin          | Quadrax           | N/A                |         |         |
| N/A                  | 854-001-03          | 8            | Pin          | Quadrax           | N/A                |         |         |
| N/A                  | 854-001-04          | 8            | Pin          | Quadrax           | N/A                |         |         |
| N/A                  | 854-001-05          | 8            | Pin          | Quadrax           | N/A                |         |         |
| N/A                  | 854-002-01          | 8            | Socket       | Quadrax           | N/A                |         |         |
| N/A                  | 854-002-02          | 8            | Socket       | Quadrax           | N/A                |         |         |
| N/A                  | 854-002-03          | 8            | Socket       | Quadrax           | N/A                |         |         |
| N/A                  | 854-002-04          | 8            | Socket       | Quadrax           | N/A                |         |         |
| N/A                  | 854-002-05          | 8            | Socket       | Quadrax           | N/A                |         |         |



# Fiber Optic Contact Selection Guide

| Glenair Part Number                                | Part Description             | Contact Size | Pin / Socket | Connector Series       |
|--|------------------------------|--------------|--------------|------------------------|
| <b>MIL-DTL-38999 Fiber Optic Contacts</b>          |                              |              |              |                        |
| <b>181-001</b>                                     | M29504/5 Socket Terminus     | 16           | Socket       | D38999 Series III      |
| <b>181-002</b>                                     | M29504/4 Pin Terminus        | 16           | Pin          | D38999 Series III      |
| <b>181-035</b>                                     | Socket, Large Core Fiber     | 16           | Socket       | D38999 Series III      |
| <b>181-036</b>                                     | Pin, Large Core Fiber        | 16           | Pin          | D38999 Series III      |
| <b>181-052</b>                                     | Jewel Pin Terminus           | 16           | Pin          | D38999 Series III      |
| <b>181-053</b>                                     | Jewel Socket Terminus        | 16           | Socket       | D38999 Series III      |
| <b>181-048</b>                                     | Sealing Plug                 | 16           | Pin          | D38999 Series III      |
| <b>181-065</b>                                     | #20 Pin Terminus             | 20           | Pin          | D38999 Series III      |
| <b>181-066</b>                                     | #20 Socket Terminus          | 20           | Socket       | D38999 Series III      |
| <b>MIL-PRF-28876 Fiber Optic Contacts</b>          |                              |              |              |                        |
| <b>181-039</b>                                     | M29504/14 Pin Terminus       | 16           | Pin          | M28876                 |
| <b>181-040</b>                                     | M29504/15 Socket Terminus    | 16           | Socket       | M28876                 |
| <b>181-051</b>                                     | M29504/3 Dummy Terminus      | 16           | Dummy        | M28876                 |
| <b>Series 80 Mighty Mouse Fiber Optic Contacts</b> |                              |              |              |                        |
| <b>181-057</b>                                     | Mighty Mouse Pin Terminus    | 16           | Pin          | Series 80 Mighty Mouse |
| <b>181-075</b>                                     | Mighty Mouse Socket Terminus | 16           | Socket       | Series 80 Mighty Mouse |

# Fiber Optic Contact Selection Guide

| Glenair Part Number  | Part Description                                     | Contact Size | Pin / Socket   | Connector Series |
|--|--|--------------|----------------|------------------|
| <b>Special Fiber Optic COTS Contacts Size 16 Front Release</b> |  |              |                |                  |
| <b>181-011</b>   | Front Release Socket with Pressure Sealing O-Ring(s) | 16           | Socket         | COTS             |
| <b>181-012</b>   | Front Release Pin                                    | 16           | Pin            | COTS             |
| <b>181-051</b>   | Dummy Terminus                                       | 16           | Dummy          | COTS             |
| <b>ARINC Type Fiber Optic Contacts</b>                         |  |              |                |                  |
| <b>181-076</b>   | ARINC 801 Terminus                                   | 16           | Genderless Pin | ARINC 801        |
| <b>187-079</b>   | M29504/6 Pin Terminus                                | 16           | Pin            | ARINC 404, 600   |
| <b>187-080</b>   | M29504/7 Socket Terminus                             | 16           | Socket         | ARINC 404, 600   |
| <b>Glenair High Density (GHD) Fiber Optic Contacts</b>         |  |              |                |                  |
| <b>181-056</b>   | GHD Terminus, Non-keyed                              | 18           | Genderless Pin | GHD              |
| <b>181-047</b>   | GHD Terminus, Keyed                                  | 18           | Genderless Pin | GHD              |
| <b>181-058</b>   | Dummy Terminus                                       | 18           | Dummy          | GHD              |
| <b>Glenair GFOCA Fiber Optic Contacts</b>                      |  |              |                |                  |
| <b>181-050</b>   | GFOCA Terminus                                       |              | Genderless Pin | GFOCA            |
| <b>181-059</b>   | Dummy Terminus                                       |              | Dummy          | GFOCA            |
| <b>Next Generation Fiber Optic (NGCON) Contacts</b>            |  |              |                |                  |
| <b>181-043</b>   | M29504/18  | 16           | Genderless Pin | M64266           |

# Special Contact Selection Guide

| Glenair Part Number  | Part Description  | Contact Size | Type          |
|----------------------|---|--------------|---------------|
| 859-012              | Grommet Sealing Plugs (MS27488 Type)  | 0-23         | Sealing Plug  |
| 809-001              | Series 80 Mighty Mouse Pin Contact  | 23           | Crimp Contact |
| 809-002              | Series 80 Mighty Mouse Socket Contact                                       | 23           | Crimp Contact |
| 830-003 <sup>1</sup> | Pneumatic Pin Contact for Series 79, Series 80, and D38999 Series I thru IV | 12           | Pneumatic     |
| 830-004 <sup>2</sup> | Pneumatic Socket Contact for Series 79, Series 80, and D38999 Series II     | 12           | Pneumatic     |
| 830-005              | Pneumatic Socket Contact for D38999 Series I, III & IV                      | 12           | Pneumatic     |
| 850-010              | PCB Pin Contact to fit D38999/20 and /24                                    | 12-22        | PCB Pin       |
| 850-011              | PCB Socket Contact to fit D38999/20 and /24                                 | 12-22        | PCB Socket    |
| 850-013              | High Power Socket Contact   | 8            | Power Socket  |
| 850-014              | High Power Pin Contact  | 8            | Power Pin     |
| 850-015              | M39029/56 Type Socket Contact with Solder Cup                               | 10-22        | Solder Cup    |
| 850-016              | Pin Contact with Solder Cup   | 10-22        | Solder Cup    |
| 850-017              | M39029/58 Type Pin Contact with Solder Cup                                  | 12-22        | Solder Cup    |
| 850-018              | M39029/56-348 Type Socket Contact   | 22           | Crimp Contact |
| 850-019              | M39029/58-360 Type Pin Contact  | 22           | Crimp Contact |
| 850-020              | M39029/57 Type Socket Contact   | 22           | Crimp Contact |
| 857-027              | M39029/58 Type High Power Pin with PC Tails                                 | 8            | PCB Power     |
| 857-028              | M39029/56 Type High Power Socket with PC Tails                              | 8            | PCB Power     |
| 687-348              | Wire to Contact Crimp Adapter   | 4-22         | Crimp Adapter |
| 850-023              | M39029/87 Thermocouple Pin Contact  | 16-22        | Thermocouple  |
| 850-024              | M39029/88 Thermocouple Socket Contact; Series I, II, IV                     | 16-22        | Thermocouple  |
| 850-025              | M39029/89 Thermocouple Socket Contact; Series II                            | 16-22        | Thermocouple  |

1. 830-003 supersedes 857-011      2. 830-004 supersedes 857-010

## Connector Manufacturers Index for Backshell and Accessory Specifications

This index of US and international connector manufacturers provides a cross-reference of manufacturers' proprietary series designations to applicable specifications. This information does

not imply qualification status but serves to indicate that the manufacturers' series is "in conformance with" the noted specifications or documents. The symbols in the Connector Designator column are an essential element in Glenair's accessory part number developments. For connector manufacturers' part number series not shown in these listings, please consult factory for applicable accessory part numbers.

| MFG SERIES                             | GLENAIR CONNECTOR DESIGNATOR | SPECIFICATION REFERENCE | SERIES   |
|--|------------------------------|-------------------------|----------|
| <b>Aero-Electric Connector Company</b> |                              |                         |          |
| AE22                                   | H                            | MIL-DTL-38999           | III      |
| AE46                                   | F                            | MIL-DTL-38999           | I        |
| AE47                                   | F                            | MIL-DTL-38999           | II       |
| AE48                                   | F                            | MIL-DTL-38999           | II       |
| AE49                                   | F                            | MIL-DTL-38999           | I        |
| AE55                                   | A                            | MIL-C-5015              | MS3400   |
| AE66                                   | E                            | MIL-DTL-26500           | Aluminum |
| AE77                                   | A                            | MIL-DTL-26482           | II       |
| AE83                                   | A                            | MIL-DTL-83723           | III      |
| <b>AB Electronics</b>                  |                              |                         |          |
| CT-R                                   | F                            | MIL-DTL-38999           | II       |
| MK                                     | 8                            | S                       | PATT 105 |
| MK                                     | 12                           | S                       | PATT 603 |
| MK                                     | 18                           | S                       | PATT 608 |
| <b>Amphenol Limited</b>                |                              |                         |          |
| JT                                     | F                            | PAN                     | 6433-1   |
| SJT                                    | L                            | JN                      | 1003     |
| SJT                                    | L                            | LN29729                 |          |
| SJT                                    | L                            | PAN                     | 6433-2   |
| 118                                    | A                            | LN                      | 29504    |
| 162GB                                  | S                            | PATT                    | 603      |
| 348                                    | J                            | VG                      | 95329    |
| 418-1                                  | F                            | PATT                    | 616      |
| 418-2                                  | F                            | PATT                    | 614      |
| 418-5                                  | L                            | NFC 93422               | HE 306   |
| 418-5                                  | L                            | PATT                    | 615      |
| 602GB                                  | A                            | PAN                     | 6432-1   |
| 602GB                                  | A                            | PATT                    | 602      |
| 62GB                                   | S                            | PATT                    | 105      |
| 652                                    | A                            | LN                      | 29504    |
| <b>Amphenol Products</b>               |                              |                         |          |
| BG                                     | D                            | MIL-DTL-26482           | I        |
| JT                                     | *                            | MIL-C-27599             |          |
| JT-R                                   | F                            | MIL-DTL-38999           | II       |

| MFG SERIES                           | GLENAIR CONNECTOR DESIGNATOR | SPECIFICATION REFERENCE | SERIES   |
|--------------------------------------|------------------------------|-------------------------|----------|
| <b>Amphenol Products (Continued)</b> |                              |                         |          |
| JT-R                                 | F                            | 40M38277                |          |
| LJT                                  | *                            | MIL-C-27599             |          |
| LJT-R                                | F                            | MIL-DTL-38999           | I        |
| MF-S                                 | D                            | MIL-DTL-26482           | I        |
| PT                                   | D                            | MIL-DTL-26482           | I        |
| PT-SE                                | D                            | MIL-DTL-26482           | I        |
| PTS-DR                               | A                            | MIL-DTL-26482           | II       |
| PTS-DR                               | A                            | MIL-DTL-83723           | I        |
| QWLD                                 | C                            | MIL-DTL-22992           | R        |
| SC                                   | B                            | MIL-C-5015              | MS3100   |
| SJT                                  | L                            | LN                      | 29729    |
| SM                                   | B                            | MIL-C-5015              | MS3100   |
| TV                                   | H                            | MIL-DTL-38999           | III      |
| TVRB                                 | H                            | CECC 75201.002          | III      |
| TVS                                  | H                            | MIL-DTL-38999           | III      |
| 10-72                                | B                            | MIL-C-5015              | MS3100   |
| 10-214                               | B                            | MIL-C-5015              | MS3100   |
| 10-475                               | F                            | 40M38277                |          |
| 48                                   | E                            | MIL-DTL-26500           | Aluminum |
| 69                                   | B                            | MIL-C-5015              | MS3100   |
| 97                                   | B                            | MIL-C-5015              | MS3100   |
| 118                                  | A                            | MIL-DTL-26482           | II       |
| 118                                  | A                            | MIL-DTL-83723           | I        |
| 246                                  | *                            | MIL-C-5015              |          |
| 348                                  | J                            | MIL-C-81511             | I-II     |
| 418-1                                | F                            | MIL-DTL-38999           | I        |
| 418-2                                | F                            | MIL-DTL-38999           | II       |
| 518                                  | A                            | MIL-DTL-83723           | III      |
| 71                                   | B                            | MIL-C-5015              | MS3100   |
| 91-483                               | A                            | MIL-DTL-26482           | II       |
| 91-483                               | A                            | MIL-DTL-83723           | I        |
| <b>Amphenol/Pyle National</b>        |                              |                         |          |
| B                                    | A                            | MIL-DTL-83723           | III      |
| T3                                   | H                            | MIL-DTL-38999           | III      |



| MFG SERIES                                      | GLENAIR CONNECTOR DESIGNATOR | SPECIFICATION REFERENCE | SERIES   |
|---|------------------------------|-------------------------|----------|
| <b>Amphenol/Pyle National (Continued)</b>       |                              |                         |          |
| ZZW   | E                            | MIL-DTL-26500           | Aluminum |
| ZZY   | E                            | MIL-DTL-26500           | Aluminum |
|   | A                            | ESC 10, ESC 11          |          |
| <b>Amphenol/Tuchel Electronics GmbH</b>         |                              |                         |          |
| 118   | A                            | LN                      | 29504    |
| 162GB   | *                            | VG                      | 95328    |
| 348   | J                            | VG                      | 95329    |
| 602GB   | A                            | DEF                     | 5326-3   |
| 602GB   | A                            | PAN                     | 6432-1   |
| 602GB   | A                            | PATT                    | 602      |
| 62GB  | *                            | DEF                     | 5326-3   |
| 652   | A                            | LN                      | 29504    |
| <b>Cie Deutsch &amp; Compagnie Deutsch GmbH</b> |                              |                         |          |
| AFD   | A                            | LN                      | 29504    |
| AFD   | A                            | MIL-DTL-26482           | I        |
| AFD   | A                            | PAN                     | 6432-1   |
| DBAS  | A                            | QPL-81703               | III      |
| DBAS  | A                            | PAN                     | 6432-2   |
| DFE   | A                            | LN                      | 29504    |
| DVG   | A                            | VG                      | 95328    |
| FDBA  | A                            | LN                      | 29504    |
| 951   | A                            | PRL                     | 53125    |
| 9.815   | J                            | MIL-C-81511             | III & IV |
| 991   | A                            | PAN                     | 6432-4   |
| 999.1   | F                            | MIL-DTL-38999           | I        |
|   | A                            | ESC 10                  |          |
|   | A                            | ESC 11                  |          |
| <b>Deutsch Engineered Connecting Devices</b>    |                              |                         |          |
| AFD5  | A                            | MIL-DTL-26482           | II       |
| AFD   | A                            | MIL-DTL-83723           | I        |
| A815  | J                            | MIL-C-81511             | III      |
| B815  | J                            | MIL-C-81511             | IV       |
| BMS   | E                            | MIL-C-26500             |          |
| BTK   | D                            | MIL-DTL-26482           | I        |
| DBA   | A                            | 40M39569                |          |
| DBA7  | A                            | QPL-81703               | III      |
| DTS   | H                            | MIL-DTL-38999           | III      |
| DIV4  | H                            | MIL-DTL-38999           | IV       |
| DL6   | A                            | MIL-DTL-83723           | III      |
| D817  | A                            | QPL-81703               | III      |
| LPT   | D                            | MIL-DTL-26482           | I        |
| 381   | A                            | 40M39569                |          |
| 450   | D                            | MIL-DTL-26482           | I        |
| 460   | D                            | MIL-DTL-26482           | I        |

| MFG SERIES   | GLENAIR CONNECTOR DESIGNATOR | SPECIFICATION REFERENCE | SERIES       |
|--|------------------------------|-------------------------|--------------|
| <b>Deutsch Engineered Connecting Devices (Continued)</b> |                              |                         |              |
| 837  | A                            | MIL-DTL-83723           | III          |
| <b>Deutsch Limited</b>                                   |                              |                         |              |
| LL   | J                            | MIL-C-81511             | III-IV       |
| DBAS   | A                            | PAN                     | 6432-2       |
| DTS  | H                            | MIL-DTL-38999           | III          |
| HDJ  | L                            | JN                      | 1003         |
| RR   | A                            | PAN                     | 6432-1       |
| RR   | A                            | PATT                    | 602          |
| RR70   | A                            | QPL-81703               | III          |
| SLPT   | *                            | MIL-DTL-26482           | I            |
| <b>Glenair</b>   |                              |                         |              |
| 90   | G                            | MIL-DTL-28840           |              |
| 80   | M                            | Mighty Mouse            | 800 Thru 805 |
| 22   | W                            | Geo-Marine®             |              |
| ITS, IT  | R                            | MIL-C-5015              |              |
| 231  | F                            | MIL-DTL-38999           | 1            |
| 232  | F                            | MIL-DTL-38999           | 2            |
| 233  | H                            | MIL-DTL-38999           | 3            |
| <b>Souriau</b>   |                              |                         |              |
| BT   | D                            | MIL-DTL-26482           | I            |
| G  | D                            | MIL-DTL-26482           | I            |
| L  | D                            | MIL-DTL-26482           | I            |
| L-T  | D                            | MIL-DTL-26482           | I            |
| M-T  | D                            | MIL-DTL-26482           | I            |
| JVS  | H                            | CECC 75201.002          |              |
| 8LT  | F                            | MIL-DTL-38999           | I            |
| 8LT  | F                            | NFC 93422               | HE 308       |
| 8ST  | L                            | JN 1003                 | 8ST-034      |
| 8ST  | L                            | LN 29729                |              |
| 8ST  | L                            | NFC 93422               | HE 306       |
| 8ST  | L                            | PAN 6433-2              |              |
| 8ST  | L                            | PATT 615                |              |
| 8ST  | L                            | VG 96912                |              |
| 8T   | F                            | MIL-DTL-38999           | II           |
| 8T   | F                            | NFC 93422               | HE 309       |
| 85   | D                            | MIL-DTL-26482           | I            |
| 851  | S                            | PATT 603                |              |
| 851-50   | *                            | NFL53125                |              |
| 851-50   | *                            | VG 95328                |              |
| 8525   | A                            | NFC 93422               | HE 302       |
| 8525.1   | A                            | LN 29504                |              |
| 8526   | A                            | MIL-DTL-26482           | II           |
| 8526   | A                            | PAN 6432-1              |              |
| 8526   | A                            | PATT 602                |              |

| MFG SERIES                           | GLENAIR CONNECTOR DESIGNATOR | SPECIFICATION REFERENCE | SERIES |
|--------------------------------------|------------------------------|-------------------------|--------|
| <b>Souriau (continued)</b>           |                              |                         |        |
| 8533                                 | A                            | EN 2992                 |        |
| 8533                                 | A                            | ESC 10                  |        |
| 8534                                 | A                            | ESC 11                  | 8534   |
| <b>Flight Connector Corporation</b>  |                              |                         |        |
| FC                                   | *                            | MIL-C-5015              |        |
| FF                                   | A                            | MIL-C-5015              | MS3400 |
| FH                                   | *                            | MIL-C-5015              |        |
| FHA                                  | K                            | MIL-DTL-83723           | II     |
| PL                                   | H                            | MIL-DTL-38999           | IV     |
| <b>G &amp; H Technologies</b>        |                              |                         |        |
| BL                                   | H                            | MIL-DTL-38999           | IV     |
| NC                                   | G                            | MIL-DTL-28840           |        |
| <b>ITT Cannon</b>                    |                              |                         |        |
| CA3106B                              | *                            | VG95234                 |        |
| CA-E / R                             | B                            | MIL-C-5015              | MS3100 |
| CA-RX                                | B                            | MIL-C-5015              | MS3100 |
| CVA                                  | K                            | MIL-DTL-83723           | II     |
| CV340                                | A                            | MIL-C-5015              | MS3400 |
| CV345                                | A                            | MIL-C-5015              | MS3450 |
| KFS                                  | G                            | MIL-DTL-28840           |        |
| KJ                                   | F                            | MIL-DTL-38999           | II     |
| KJ                                   | F                            | 40M38277                |        |
| KJA                                  | H                            | MIL-DTL-38999           | III    |
| KJL                                  | F                            | MIL-DTL-38999           | I      |
| KPSE                                 | D                            | MIL-DTL-26482           | I      |
| KPT                                  | D                            | MIL-DTL-26482           | I      |
| MF                                   | A                            | MIL-DTL-83723           | III    |
| PV-G                                 | A                            | 40M39569                |        |
| PVA                                  | A                            | MIL-DTL-83723           | I      |
| PV7                                  | A                            | MIL-DTL-26482           | II     |
| A                                    | ESC 10                       | KE, SE                  |        |
| <b>ITT Cannon Electric France SA</b> |                              |                         |        |
| KJ                                   | F                            | MIL-DTL-38999           | II     |
| KJ                                   | F                            | PAN                     | 6433-1 |
| KJL                                  | F                            | MIL-DTL-38999           | I      |
| 251                                  | *                            | MIL-DTL-26482           | I      |
| <b>ITT Cannon UK Ltd.</b>            |                              |                         |        |
| KJ                                   | F                            | PATT                    | 614    |
| KPSE                                 | D                            | MIL-DTL-26482           | I      |
| PV-S                                 | A                            | MIL-DTL-83723           | I      |
| PVW                                  | A                            | LN29504                 |        |
| PVX                                  | A                            | PAN                     | 6432-1 |
| PVX                                  | A                            | PATT                    | 602    |
| A                                    | ESC 10                       | KE, SE                  |        |

| MFG SERIES                      | GLENAIR CONNECTOR DESIGNATOR | SPECIFICATION REFERENCE | SERIES   |
|---------------------------------|------------------------------|-------------------------|----------|
| <b>ITT Cannon Electric GmbH</b> |                              |                         |          |
| CA3106B                         | *                            | VG 95234                |          |
| CGK                             | L                            | LN 29729                |          |
| CWLD                            | C                            | MIL-DTL-22992           | R        |
| KJ                              | F                            | PAN 6433-1              |          |
| KPSE                            | *                            | VG 95328                |          |
| KPT                             | *                            | VG 95328                |          |
| PVW                             | A                            | LN 29504                |          |
| PVX                             | A                            | PAN 6432-1              |          |
| <b>J-Tech</b>                   |                              |                         |          |
| JT 3400                         | A                            | MIL-C-5015              | MS3400   |
| JT 3450                         | A                            | MIL-C-5015              | MS3450   |
| JTVG95234                       | A                            | VG95234                 |          |
| <b>Labinal/Cinch</b>            |                              |                         |          |
| CNO930                          | A                            | MIL-DTL-83723           | III      |
| 48                              | E                            | MIL-DTL-26500           | Aluminum |
| <b>RMS</b>                      |                              |                         |          |
| RO                              |                              | MIL-DTL-26500           | Aluminum |
| <b>Schaltbau GmbH</b>           |                              |                         |          |
| 650                             | J                            | VG 95329                |          |
| 674                             | *                            | VG 95328                |          |
| 675                             | *                            | VG 95328                |          |
| 679                             | J                            | VG 95329                |          |
| <b>SICEM</b>                    |                              |                         |          |
| SCB                             | *                            | VG 95234                |          |
| <b>Sunbank</b>                  |                              |                         |          |
| JSC                             |                              | MIL-DTL-28840           |          |
| <b>ITT Cannon</b>               |                              |                         |          |
| TT                              | F                            | PAN 6433-1              |          |
| PT                              | S                            | PATT 105                |          |
| PT-SE                           | S                            | PATT 603                |          |
| STT                             | L                            | LN 29729                |          |
| STT                             | L                            | PAN 6433-2              |          |
| STT                             | L                            | PATT 615                |          |
| STT                             | L                            | VG 96912                |          |
| <b>ITT VEAM</b>                 |                              |                         |          |
| CIR                             | *                            | VG 95234                |          |
| VPT                             | D                            | MIL-DTL-26482           | I        |
| VPT-SE                          | *                            | MIL-DTL-26482           | I        |
| VPT-SE                          | *                            | VG 95328                |          |

# Mod 429 Space Grade Processing Information

## What is Outgassing?

Plastic and rubber materials give off gaseous molecules. For example, the smell inside a new car is caused by polymer outgassing. Heat and vacuum increase the rate of diffusion. In a spacecraft the gases coming off polymers can contaminate optical surfaces and instruments. The result is degraded performance.

## How is Outgassing Measured?

The space industry has adopted a standardized test procedure, **ASTM E 595**, to evaluate out-gassing properties of polymers. Small samples of material are heated to 125° C. at a vacuum of 5 X 10<sup>-5</sup> torr for 24 hours. Then the sample is weighed to calculate the **Total Mass Loss** (TML). The TML cannot exceed 1.00% of the total initial mass. During the test, outgassed matter condenses on a cooled collector plate. The quantity of outgassed matter is calculated to determine the **Collected Volatile Condensable Material** (CVCM). The CVCM cannot exceed 0.10% of the original specimen mass.

## Do All Connectors Require Special Outgassing Processing?

No. Most connectors meet NASA outgassing requirements without special processing.

## What is NASA Screening?

NASA specification EEE-INST-002 provides instructions on selecting, screening and qualifying parts for use on NASA GSFC space flight projects. Table 2J in the NASA spec contains specific inspection instructions for Nanominiature connectors. These screening requirements exceed the standard mil spec inspection levels.

## What Screening Level is Required for Space Applications?

NASA defines three levels of screening: level 1 for highest reliability, level 2 for high reliability, and level 3 for standard reliability.

## Is Glenair NASA Certified?

Yes. Meeting NASA requirements means not only inspecting per EEE-INST-002, but also building parts in accordance with NASA Technical Standard NASA-STD-8739.4 “Crimping, Interconnecting Cables, Harnesses, and Wiring”. Glenair fully meets

these requirements and has obtained NASA certification. Our extra inspection steps reflect the fact that pre-wired connectors not only require best practices on the assembly floor, but also require thorough final electrical and mechanical testing.

Spacecraft designers generally avoid the use of ferromagnetic materials, which can become magnetized and can interfere with sensitive instruments.

## What about cryogenics?

Most Glenair environmental connectors are rated to -65° C. Glenair has not

| SCREENING REQUIREMENTS                     |                               |                              |
|--|-------------------------------|------------------------------|
| Inspection/ Test                           | Glenair Level 1<br>(Mod 429B) | Glenair Level 2<br>(Mod 429) |
| Visual Inspection                          | 100% (10X)                    | 100%                         |
| Mechanical                                 | 100%                          | 2 pcs.                       |
| Voltage (DWV)                              | 100%                          | 100%                         |
| Insulation Resistance                      | 100%                          | 100%                         |
| Low Level Contact Resistance               | 100% (Read and Record)        | 2 pcs. (Read and Record)     |
| Mating Force                               | 2 pcs.                        | N/A                          |
| Contact/Wire Retention                     | 2 pcs.                        | N/A                          |
| Solderability/Resistance to Soldering Heat | 2 pcs.                        | N/A                          |

performed testing below this temperature. EEE-INST-002 states "...experience has proven it is possible for (non-certified) connector types to be used successfully at cryogenic temperatures. It is recommended that connector samples should be subjected to five cycles of cryogenic temperature...(followed by examination for cracks and DWV)". Cadmium plated shells are prohibited from space programs. Other plating materials are acceptable.

## *Specifying Space Grade Connectors*

**STEP  
1**

### Select suitable shell materials and plating

Titanium shells, nickel-plated aluminum shells and stainless steel shells are suitable for use in vacuum environments. Cadmium plating is prohibited for space flight.

**STEP  
2**

### Select a NASA Screening Level

The term "Screening Level" refers to the final inspection procedure.  
 Level 1 for mission-critical highest reliability  
 Level 2 for high reliability  
 Level 3 for standard reliability

**STEP  
3**

### Outgassing Processing

Most Glenair connectors are certified to meet NASA outgassing requirements without special processing. However, if additional outgassing processing is required, choose the appropriate suffix code from the table below.

**STEP  
4**

### Select the Mod 429 Code that Matches the Desired Level of Screening and Outgassing

Use the following table to choose the right modification code. Add the mod code to the connector part number.  
 Example: 233-105-07-M11-21SN-**429**

| NASA Screening Level         | Special Screening Only     | 48 Hour Oven Bake<br>175° C. | Thermal Vacuum Outgassing<br>24 hrs. 125° C. |
|------------------------------|----------------------------|------------------------------|--|
| Level 1 Highest Reliability  | Mod 429B                   | Mod 429J                     | Mod 429C                                     |
| Level 2 High Reliability     | Mod 429                    | Mod 429K                     | Mod 429A                                     |
| Level 3 Standard Reliability | (Use standard part number) | Mod 186                      | Mod 186M                                     |



## Outgassing Properties and Processing

Nonmetallic materials such as rubber, plastic, adhesives and potting compounds can give off gasses when subjected to a vacuum or high heat. The space industry has adopted a standardized test procedure, ASTM E 595, to evaluate outgassing properties of products that contain polymer materials. In the ASTM test, material samples are heated to 125° C at a vacuum of  $5 \times 10^{-5}$  torr for 24 hours. The test sample is then weighed to calculate the Total Mass Loss (TML), which may not exceed 1.00% of the total initial mass. Likewise the quantity of outgassed matter is weighed to determine the Collected Volatile Condensable Material (CVCM), which may not exceed 0.10% of the original specimen mass.

For space grade applications, Glenair is able to offer both an 8 hour 400° bakeout process as well as a 24 hour 125° thermal vacuum outgassing process on connector products that must conform to NASA screening or other outgassing standards.

Our experience has been that the simpler bakeout process is more than adequate to meet the ASTM E 595 benchmark of 1.00% TML and 0.10% CVCM.

Glenair is well versed in supplying connector products that are optimized for use in space grade applications, and we supply MIL-DTL-38999 type compliant to EEE-INST-002, Table 2G, the recognized standard for space grade connectors. Section C2 “Connectors and Contacts” of NASA EEE-INST-002 provides guidelines for materials used in connectors for space flight applications: Aluminum is a preferred material for connector components, and electroless nickel is the preferred finish. Beryllium copper is a preferred material for contacts. 50 microinch minimum gold plating is the preferred contact finish. Epiial is a preferred material for dielectric insulating materials. Specify “M” for aluminum shells with electroless nickel finish.

### OUTGASSING PROPERTIES OF TYPICAL AEROSPACE CONNECTOR MATERIALS

| Component   | Material   | TML % | TCVML % | Test Reference   |
|---|--|-------|---------|--|
| Front and Rear Insulator                            | Liquid Crystal Polymer Vectra C130   | 0.03  | 0.0     | NASA Test # GSC17478                                     |
| Rear Grommet  | Blended fluorosilicone/silicone elastomer, 30% silicone per AA-59588, 70% flourosilicone per MIL-DTL-25988 | 0.48  | 0.14    | Glenair testing conducted at NuSil Technology 02/27/2001 |
| Interfacial Seal                                    |  |       |         |  |
| Peripheral Seal                                     |  |       |         |  |
| Front-To-Rear Insulator Bonding Material            | Eccobond 104 A/B   | 0.52  | 0.08    | Emerson & Cuming Data Sheet                              |
| Insulator-to-Rubber Bonding Material                | DC3145 RTV, per MIL-A-46146  | 1.74  | 0.90    | NASA Test GSFC0191                                       |
| Coupling Nut Retainer                               | Torlon® 4203L  | 1.88  | 0.01    | Glenair Test at NuSil Technology 03-12-2003              |
| Coupling Nut Epoxy                                  | Hysol C9-4215  | 0.48  | 0.01    | Glenair Test   |
| White Epoxy Ink for Silk-screening                  | Markem 7224 White  | 0.49  | 0.03    | NASA Test #GSC19899                                      |
| Potting Compound, Solder Cup and PC Tail Connectors | Hysol C9-4215  | 0.48  | 0.01    | Glenair Test   |
| Potting Compound, Filter Receptacles                | Stycast epoxy, 2850FT/Catalyst 11  | 0.29  | 0.02    | Mfgr Data Sheet  |

1. Fluorosilicone rubber components such as O-rings and grommets exceed NASA outgassing limits.
2. NASA recommends outgassing processing to reduce outgassing to acceptable levels.
3. An inexpensive oven bakeout has better results than the more costly thermal vacuum outgassing. The higher temperature of the oven bakeout is more effective at removing volatile materials. However, both methods assure compliance with outgassing limits.
4. Glenair Mod 429 codes provide an easy ordering solution, whatever the outgassing option. Spacecraft designers generally avoid the use of ferromagnetic materials, which can become magnetized and can interfere with sensitive instruments. Aluminum shell connectors have a maximum permeability of 2  $\mu$ . Hermetic connector pins are iron alloy, a highly magnetic material.
5. Space programs sometimes need cryogenic connectors capable of withstanding temperatures as low as -270° C. D38999 connectors are rated to -65° C. Glenair does not have data to validate these connectors for cryogenic applications. EEE-INST-002 states "...experience has proven it is possible for (non-certified) connector types to be used successfully at cryogenic temperatures. It is recommended that connector samples should be subjected to five cycles of cryogenic temperature...(followed by examination for cracks and DWV)".

### MIL-DTL-38999 CONNECTOR MATERIALS APPROVED FOR SPACE FLIGHT


| Component  | Material  | Notes                          |
|--|---|--------------------------------|
| Shells, Coupling Nuts, Jam Nuts                    | Aluminum alloy 6061 per ASTM B211, electroless nickel plated  | Approved for Space Flight      |
| Rigid Insulators                                   | Glass-filled Epoxy, Epial 1908  | Approved for Space Flight      |
| Contact Retention Clip                             | Beryllium copper, heat-treated, unplated  | Approved for Space Flight      |
| Grommet, Peripheral Seal, Interfacial Seal, O-ring | Blended fluorosilicone/silicone elastomer, 30% silicone per AA-59588, 70% fluorosilicone per MIL-DTL-25988  | Requires outgassing processing |
| Hermetic Insert                                    | Vitreous glass  | Approved for Space Flight      |
| Pin Contact  | Beryllium copper alloy per ASTM B197, 50 microinches gold plated per ASTM B488 Type 3 Code C Class 1,27 over nickel plate per QQ-N-290 Class 2, 50-100 microinches      | Approved for Space Flight      |
| Pin Contact, Hermetic                              | Nickel-iron alloy per ASTM F30 (Alloy 52), 50 microinches gold plated per ASTM B488 Type 3 Code C Class 1,27 over nickel plate per QQ-N-290 Class 2, 50-100 microinches | Ferromagnetic material.        |
| Socket Contact                                     | Beryllium copper alloy per ASTM B197, 50 microinches gold plated per ASTM B488 Type 3 Code C Class 1,27 over nickel plate per QQ-N-290 Class 2, 50-100 microinches.     | Approved for Space Flight      |
| Socket Contact Hood                                | Stainless steel, passivated per AMS-QQ-P-35   | Approved for Space Flight      |
| Adhesives  | RTV and epoxies (see following table for outgassing info)   | Requires outgassing processing |
| Potting Compound, PCB and Solder Cup Versions      | Environmental and Hermetic Connectors: Stycast 2651/Catalyst 9 epoxy encapsulant. Filter Connectors: Stycast 2850FT/Catalyst 11 thermally conductive epoxy encapsulant. | Approved for Space Flight      |
| Filter Element                                     | Multilayer Ceramic Planar Array, ferrite inductors  | Approved for Space Flight      |

# Glenair Connector Material and Finish Options

| Code       | Material        | Finish                     | Finish Specification                                      |
|------------|-----------------|----------------------------|---|
| <b>AB</b>  | Marine Bronze   | Unplated                   | AMS 4640 alloy, unplated                                  |
| <b>AL</b>  | Aluminum        | AlumiPlate, Clear Chromate | MIL-DTL-83488, Class 2, Type II over electroless nickel   |
| <b>C</b>   | Aluminum        | Anodize, Black             | AMS-A-8625 Type II Class 2                                |
| <b>E</b>   | Aluminum        | Chem Film                  | MIL-DTL-5541 Type 1 Class 3                               |
| <b>G2</b>  | Aluminum        | Anodize, Hardcoat          | AMS-A-8625, Type III, Class 1, .002" thick                |
| <b>JF</b>  | Aluminum        | Cadmium, Gold              | SAE-AMS-QQ-P-416 Type II, Class 2 over electroless nickel |
| <b>LF</b>  | Aluminum        | Cadmium, Clear             | SAE-AMS-QQ-P-416 Type II Class 2 over electroless nickel  |
| <b>M</b>   | Aluminum        | Electroless Nickel         | AMS-C-26074 Class 4 Grade B; ASTM-B-733, SC 2, Type IV    |
| <b>MT</b>  | Aluminum        | Nickel-PTFE                | GMF-002 Type II Class 1                                   |
| <b>NC</b>  | Aluminum        | Zinc-Cobalt, Olive Drab    | ASTM B 840 Grade 6 Type D over electroless nickel         |
| <b>NF</b>  | Aluminum        | Cadmium, Olive Drab        | SAE-AMS-QQ-P-416 Type II Class 2 over electroless nickel  |
| <b>TP2</b> | Titanium        | Electrodeposited Nickel    | SAE-AMS-QQ-N-290 Class 1 Grade F                          |
| <b>UC</b>  | Aluminum        | Zinc-Cobalt, Black         | ASTM B 840 Grade 6 Type D over electroless nickel         |
| <b>UCR</b> | Aluminum        | Zinc-Cobalt, Black         | ASTM B 840 Grade 6 Type D over electroless nickel         |
| <b>UF</b>  | Aluminum        | Cadmium, Black             | SAE-AMS-QQ-P-416 Type II Class 2 over electroless nickel  |
| <b>XAL</b> | Composite       | AlumiPlate                 | MIL-DTL-86448, Class 2, Type II over electroless nickel   |
| <b>XB</b>  | Composite       | Unplated Black             |   |
| <b>XM</b>  | Composite       | Electroless Nickel         | AMS-C-26074 Class 4, Grade B                              |
| <b>XMT</b> | Composite       | Nickel-PTFE                | GMF-002 Type II Class 2                                   |
| <b>XW</b>  | Composite       | Cadmium, Olive Drab        | SAE-AMS-QQ-P-416 Type II Class 3 over electroless nickel  |
| <b>XZN</b> | Composite       | Zinc-Nickel, Black         | ASTM B841 Grade 5 over electroless nickel                 |
| <b>Z1</b>  | Stainless Steel | Passivate                  | SAE AMS 2700  |
| <b>Z16</b> | Aluminum        | Electroless Nickel         | AMS-C-26074 Class 4 Grade B                               |
| <b>Z2</b>  | Aluminum        | Gold                       | MIL-DTL-45204 Class 1 over electroless nickel             |
| <b>ZC</b>  | Stainless Steel | Zinc-Cobalt, Black         | ASTM-B840, Grade 6  |
| <b>ZCR</b> | Stainless Steel | Zinc-Cobalt, Black         | ASTM-B840, Grade 6  |
| <b>ZL</b>  | Stainless Steel | Electrodeposited Nickel    | SAE-AMS-QQ-N-290 Class 2 Grade F                          |
| <b>ZM</b>  | Stainless Steel | Electroless Nickel         | AMS-C-26074 Class 1 Grade A                               |
| <b>ZMT</b> | Stainless Steel | Nickel-PTFE                | GMF-002 Type II Class 3                                   |
| <b>ZN</b>  | Aluminum        | Zinc-Nickel, Olive Drab    | ASTM B841 Grade 5 over electroless nickel                 |
| <b>ZNU</b> | Aluminum        | Zinc-Nickel, Black         | ASTM B841 Grade 5 over electroless nickel                 |
| <b>ZU</b>  | Stainless Steel | Cadmium, Black             | SAE-AMS-QQ-P-416 Type II Class 2                          |
| <b>ZW</b>  | Stainless Steel | Cadmium, Olive Drab        | SAE-AMS-QQ-P-416 Type II Class 2 over electroless nickel  |
| <b>ZR</b>  | Aluminum        | Zinc-Nickel, Black         | ASTM B841 Grade 5 over electroless nickel                 |



This chart presents a selection of the broad range of base materials and plating options available from Glenair. Innovation and qualification of material and finish types is a major Glenair strength.

| Hrs. Salt Spray | Electrical Conductivity | Operating Temp. Range |  | Notes  |
|-----------------|-------------------------|-----------------------|---|--|
| 1000            | Conductive              | -65 to +200°C         | ✓   | Marine and geo-physical applications                         |
| 500             | Conductive              | -65 to +175°C         | ✓   | Approved for MIL-DTL-38999L and MIL-DTL-83513G.              |
| 336             | Non-Conductive          | -65 to +175°C         | ✓   | Glenair's standard black anodize finish.                     |
| 168             | Conductive              | -65 to +175°C         |   | Glenair's standard chem film finish.                         |
| 336             | Non-Conductive          | -65 to +200°C         | ✓   | Dark olive grey color. Glenair's preferred hardcoat finish.  |
| 48              | Conductive              | -65 to +175°C         |   | Glenair's preferred gold cadmium finish.                     |
| 48              | Conductive              | -65 to +175°C         |   | Glenair's preferred clear cadmium finish.                    |
| 48              | Conductive              | -65 to +200°C         | ✓   | Glenair's standard electroless nickel finish.                |
| 500             | Conductive              | -65 to +175°C         | ✓   | Approved for MIL-DTL-38999L and MIL-DTL-83513G.              |
| 350             | Conductive              | -65 to +175°C         |   | Glenair's standard olive drab zinc-cobalt finish.            |
| 500             | Conductive              | -65 to +175°C         |   | Glenair's standard olive drab cadmium finish.                |
| 96              | Conductive              | -65 to +200°C         | ✓   | Glenair's preferred finish for titanium connectors.          |
| 240             | Conductive              | -65 to +175°C         |   | Glenair's standard black zinc-cobalt finish.                 |
| 240             | Conductive              | -65 to +175°C         | ✓   | RoHS version of UC.  |
| 48              | Conductive              | -65 to +175°C         |   | Glenair's preferred black cadmium finish.                    |
| 2000            | Conductive              | -65 to +175°C         | ✓   | Approved for MIL-DTL-38999L.                                 |
| 2000            | Non-Conductive          | -65 to +175°C         | ✓   | Glenair's standard unplated composite.                       |
| 2000            | Conductive              | -65 to +200°C         | ✓   | Glenair's standard electroless nickel finish over composite. |
| 2000            | Conductive              | -65 to +200°C         | ✓   | Approved for MIL-DTL-38999L.                                 |
| 2000            | Conductive              | -65 to +175°C         |   | Glenair's standard olive drab cadmium finish over composite. |
| 2000            | Conductive              | -65 to +175°C         |   | Glenair's standard black zinc-nickel finish over composite.  |
| 500             | Conductive              | -65 to +200°C         | ✓   | Glenair's standard passivated stainless steel.               |
| 48              | Conductive              | -65 to +200°C         | ✓   | Standard matte electroless nickel for space applications     |
| 48              | Conductive              | -65 to +200°C         | ✓   | Glenair's standard gold plating for space programs.          |
|                 | Conductive              | -65 to +175°C         |   | Glenair's standard zinc-cobalt over stainless steel.         |
|                 | Conductive              | -65 to +175°C         | ✓   | RoHS version of ZC.  |
| 500             | Conductive              | -65 to +200°C         | ✓   | Glenair's preferred nickel-plated stainless steel.           |
|                 | Conductive              | -65 to +200°C         | ✓   | Used on hermetic connectors. Use ZM for other applications.  |
| 1000            | Conductive              | -65 to +175°C         | ✓   | Glenair's new 1000 Hour Grey over stainless steel.           |
| 500             | Conductive              | -65 to +175°C         |   | Glenair's standard olive drab zinc-nickel finish.            |
| 500             | Conductive              | -65 to +175°C         |   | Glenair's standard black zinc-nickel finish.                 |
| 500             | Conductive              | -65 to +175°C         |   | Glenair's standard black cadmium over stainless steel.       |
| 500             | Conductive              | -65 to +175°C         |   | Glenair's standard olive drab cadmium over stainless steel.  |
| 500             | Conductive              | -65 to +175°C         | ✓   | Glenair's RoHS compliant black zinc-nickel                   |



# Glenair Connector Plating Code and Mil-Spec Connector Finish Code Cross-Reference

## MIL-DTL-38999

### Series I and II

| Finish Code | Material, Finish  | Recommended Glenair Plating Code |
|-------------|---|----------------------------------|
| A           | Aluminum, Cadmium Plated, Clear Chromate                  | LF                               |
| B           | Aluminum, Cadmium Plated, Olive Drab                      | NF                               |
| C           | Aluminum, Anodize, Hardcoat                               | G                                |
| E           | Stainless Steel, Passivated                               | Z1                               |
| F           | Aluminum, Electroless Nickel Plated                       | M                                |
| N           | Stainless Steel, Electrodeposited Nickel (Hermetic)       | ZL                               |
| P           | Aluminum, Pure Dense Aluminum (AlumiPlate <sup>SM</sup> ) | AL                               |
| R           | Aluminum, Electroless Nickel                              | ME                               |
| T           | Aluminum, Nickel-PTFE                                     | MT                               |
| U           | Aluminum, Cadmium Plated, Clear Chromate                  | LF                               |
| X           | Aluminum, Cadmium Plated, Olive Drab                      | NF                               |
| Z           | Aluminum, Black Zinc-Nickel                               | ZR                               |

## MIL-DTL-38999

### Series III and

### IV Class Code

| Material, Finish  | Recommended Glenair Plating Code |
|---|----------------------------------|
| Aluminum, Anodize, Hardcoat                               | G                                |
| Aluminum, Electroless Nickel                              | M                                |
| Aluminum, Electroless Nickel                              | M                                |
| Stainless Steel, Passivated                               | Z1                               |
| Composite, Cadmium Plated, Olive Drab                     | XW                               |
| Stainless Steel, Passivated                               | Z1                               |
| Stainless Steel, Electrodeposited Nickel                  | ZL                               |
| Composite, Electroless Nickel Plated                      | XM                               |
| Stainless Steel, Electrodeposited Nickel (Hermetic)       | ZL                               |
| Aluminum, Pure Dense Aluminum (AlumiPlate <sup>SM</sup> ) | AL                               |
| Aluminum, Electroless Nickel                              | ME                               |
| Stainless Steel, Electrodeposited Nickel                  | ZL                               |
| Aluminum, Nickel-PTFE                                     | MT                               |
| Aluminum, Cadmium Plated, Olive Drab                      | NF                               |
| Aluminum, Cadmium Plated, Olive Drab                      | NF                               |
| Stainless Steel, Passivated                               | Z1                               |
| Aluminum, Black Zinc-Nickel                               | ZR                               |

**MIL-DTL-28840****Recommended  
Glenair Plating  
Code**

| <b>Finish Code</b> | <b>Material, Finish</b>                    |           |
|--------------------|--|-----------|
| <b>A</b>           | Aluminum, Cadmium Olive Drab over Nickel   | <b>NF</b> |
| <b>B</b>           | Stainless Steel, Cadmium-Black over Nickel | <b>ZU</b> |
| <b>L</b>           | Aluminum, Nickel PTFE                      | <b>MT</b> |
| <b>S</b>           | Aluminum, Zinc Nickel, Non-Reflective      | <b>ZR</b> |

**SAE AS50151****Recommended  
Glenair  
Accessory  
Code**

| <b>Class Code</b>                        | <b>Material, Finish</b>              |           |
|--|--------------------------------------|-----------|
| <b>A, B, C, D, E, DJ,<br/>F, P, R, W</b> | Aluminum, Cadmium Plated, Olive Drab | <b>NF</b> |
| <b>H, K</b>                              | Stainless Steel, Electroless Nickel  | <b>ZM</b> |
| <b>L,U</b>                               | Aluminum, Electroless Nickel         | <b>M</b>  |

**MIL-DTL-26482****Recommended  
Glenair  
Accessory  
Code**

| <b>Material, Finish</b> |                                      |
|-------------------------|--------------------------------------|
| <b>Series I</b>         | Aluminum, Cadmium Plated, Olive Drab |
| <b>Series 2 Class L</b> | Electroless Nickel                   |
| <b>Series 2 Class W</b> | Aluminum, Cadmium Plated, Olive Drab |

**AS85049****Recommended  
Glenair  
Accessory  
Code**

| <b>Finish Code</b> | <b>Material, Finish</b>                              |            |
|--------------------|--|------------|
| <b>A</b>           | Aluminum, Black Anodize                              | <b>C</b>   |
| <b>B</b>           | Stainless Steel, Cadmium Plated, Black               | <b>ZU</b>  |
| <b>G</b>           | Aluminum, Electroless Nickel Plated (Space)          | <b>M</b>   |
| <b>J</b>           | Composite, Cadmium Plated, Olive Drab                | <b>XW</b>  |
| <b>L</b>           | Composite, Cadmium Plated, Olive Drab <sup>(1)</sup> | <b>XX</b>  |
| <b>M</b>           | Composite, Electroless Nickel Plated                 | <b>XM</b>  |
| <b>N</b>           | Aluminum, Electroless Nickel Plated                  | <b>M</b>   |
| <b>P</b>           | Aluminum, Cadmium Plated, Olive Drab <sup>(1)</sup>  | <b>NFP</b> |
| <b>W</b>           | Aluminum, Cadmium Plated, Olive Drab                 | <b>NF</b>  |
| <b>T</b>           | Composite, Unplated                                  | <b>XO</b>  |

(1) Selective plated with polysulfide barrier

# MIL-DTL-38999 Series III Performance Specifications

Scoop Proof, Triple Start, Self-Locking, Threaded Coupling Connector

| REQUIREMENT   | PERFORMANCE SPECIFICATIONS  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
|---|---|------------------------------|------------------|-------------------|-----------|-----|-----------|------------------|------------------|------------------|-------------------|-----------|-----------|-------|------|-------|-----------|-------|-----|-------|-----|-----------|-----|-------|-----|--------|------------|-----|-----|-----|-----|
| <p>Test Voltage (Dielectric Withstanding Voltage)</p> | <p>Wired, assembled, unmated connectors withstand the following:</p> <table border="1" data-bbox="591 436 1279 688"> <thead> <tr> <th colspan="5">Test Voltages, ac rms, 60 Hz</th> </tr> <tr> <th>Altitude</th> <th>Service Rating M</th> <th>Service Rating N</th> <th>Service Rating I</th> <th>Service Rating II</th> </tr> </thead> <tbody> <tr> <td>Sea level</td> <td>1300</td> <td>1000</td> <td>1800</td> <td>2300</td> </tr> <tr> <td>50,000 ft</td> <td>550</td> <td>400</td> <td>600</td> <td>800</td> </tr> <tr> <td>70,000 ft</td> <td>350</td> <td>260</td> <td>400</td> <td>500</td> </tr> <tr> <td>100,000 ft</td> <td>200</td> <td>260</td> <td>200</td> <td>200</td> </tr> </tbody> </table>                                     | Test Voltages, ac rms, 60 Hz |                  |                   |           |     | Altitude  | Service Rating M | Service Rating N | Service Rating I | Service Rating II | Sea level | 1300      | 1000  | 1800 | 2300  | 50,000 ft | 550   | 400 | 600   | 800 | 70,000 ft | 350 | 260   | 400 | 500    | 100,000 ft | 200 | 260 | 200 | 200 |
| Test Voltages, ac rms, 60 Hz                          |   |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| Altitude  | Service Rating M  | Service Rating N             | Service Rating I | Service Rating II |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| Sea level   | 1300  | 1000                         | 1800             | 2300              |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 50,000 ft   | 550   | 400                          | 600              | 800               |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 70,000 ft   | 350   | 260                          | 400              | 500               |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 100,000 ft  | 200   | 260                          | 200              | 200               |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| <p>Insulation Resistance</p>                          | <p>Unmated connectors shall be tested as specified in <b>test method EIA-364-21</b> 5000 megohms min. at 25° C</p>  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| <p>Supported Wire Size</p>                            | <table border="1" data-bbox="591 848 1140 1079"> <thead> <tr> <th>Contact Size</th> <th>Wire Gauge</th> </tr> </thead> <tbody> <tr> <td>22D</td> <td>#22 - #28</td> </tr> <tr> <td>20</td> <td>#20 - #24</td> </tr> <tr> <td>16</td> <td>#16 - #20</td> </tr> <tr> <td>12</td> <td>#12 - #14</td> </tr> <tr> <td>10</td> <td>#10 - #12</td> </tr> </tbody> </table>   | Contact Size                 | Wire Gauge       | 22D               | #22 - #28 | 20  | #20 - #24 | 16               | #16 - #20        | 12               | #12 - #14         | 10        | #10 - #12 |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| Contact Size  | Wire Gauge  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 22D   | #22 - #28   |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 20  | #20 - #24   |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 16  | #16 - #20   |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 12  | #12 - #14   |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 10  | #10 - #12   |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| <p>EMI Shielding</p>                                  | <p>Effective over a range of 100 MHz to 10 GHz with a minimum 50dB effectiveness at 10 GHz, IAW <b>test method EIA-364-10</b></p> <table border="1" data-bbox="591 1197 1140 1696"> <thead> <tr> <th>Frequency MHz</th> <th>Series III</th> </tr> </thead> <tbody> <tr> <td>100</td> <td>90</td> </tr> <tr> <td>200</td> <td>88</td> </tr> <tr> <td>300</td> <td>88</td> </tr> <tr> <td>400</td> <td>87</td> </tr> <tr> <td>800</td> <td>85</td> </tr> <tr> <td>1,000</td> <td>85</td> </tr> <tr> <td>1,500</td> <td>76</td> </tr> <tr> <td>2,000</td> <td>70</td> </tr> <tr> <td>3,000</td> <td>69</td> </tr> <tr> <td>4,000</td> <td>68</td> </tr> <tr> <td>6,000</td> <td>66</td> </tr> <tr> <td>10,000</td> <td>65</td> </tr> </tbody> </table> | Frequency MHz                | Series III       | 100               | 90        | 200 | 88        | 300              | 88               | 400              | 87                | 800       | 85        | 1,000 | 85   | 1,500 | 76        | 2,000 | 70  | 3,000 | 69  | 4,000     | 68  | 6,000 | 66  | 10,000 | 65         |     |     |     |     |
| Frequency MHz   | Series III  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 100   | 90  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 200   | 88  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 300   | 88  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 400   | 87  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 800   | 85  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 1,000   | 85  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 1,500   | 76  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 2,000   | 70  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 3,000   | 69  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 4,000   | 68  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 6,000   | 66  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |
| 10,000  | 65  |                              |                  |                   |           |     |           |                  |                  |                  |                   |           |           |       |      |       |           |       |     |       |     |           |     |       |     |        |            |     |     |     |     |

# MIL-DTL-38999 Series III Performance Specifications

## Scoop Proof, Triple Start, Self-Locking, Threaded Coupling Connector

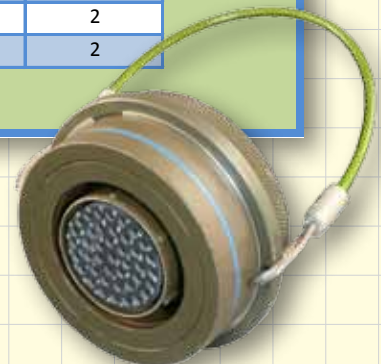
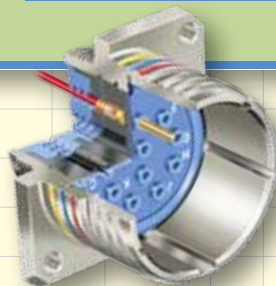
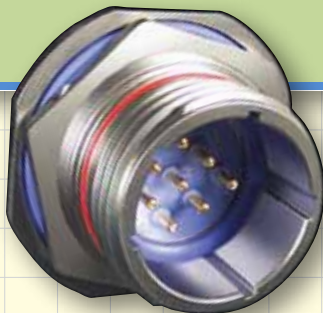
| REQUIREMENT         | PERFORMANCE SPECIFICATIONS   |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
|---------------------|--|----------------|-------|---|---------------------------------|---|---|---|---------------------------------|---|------------------------------------|---|----------------------------------|---|---|---|---------------------------|---|------------------------|---|---|---|---------|---|---|---|---------|---|--|
| Thermal Shock       | After cycling the connector between -65° C and +175° C, it will meet all applicable electrical and mechanical requirements.  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| Physical Shock      | No loosening of parts, cracking or other deleterious results hindering further part operation after 300 G's in each of 3 mutually perpendicular planes.  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| Fluid Compatibility | Designed to function in all fluids encountered in any modern military or aerospace environment.  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| Fluid Immersion     | <p>Connector samples shall be tested IAW test procedure EIA-364-10 (One sample per fluid). Following fluid immersion cycles, the connectors shall be tested for coupling torque and DWV per MIL-DTL-38999 within 3 hours.</p> <table border="1" data-bbox="591 942 1279 1638"> <thead> <tr> <th data-bbox="591 942 867 993">Test Condition</th> <th data-bbox="867 942 1279 993">Fluid</th> </tr> </thead> <tbody> <tr> <td data-bbox="591 993 867 1026">A</td> <td data-bbox="867 993 1279 1026">Hydraulic Fluid, per MIL-H-5606</td> </tr> <tr> <td data-bbox="591 1026 867 1089">B</td> <td data-bbox="867 1026 1279 1089">Turbine Fluid, grade JP-8, per MIL-DTL-83133 (NATO Type 34)</td> </tr> <tr> <td data-bbox="591 1089 867 1121">C</td> <td data-bbox="867 1089 1279 1121">Lubricating oil, per MIL-L-7808</td> </tr> <tr> <td data-bbox="591 1121 867 1152">D</td> <td data-bbox="867 1121 1279 1152">Lubricating Oil, per MIL-PRF-23699</td> </tr> <tr> <td data-bbox="591 1152 867 1184">E</td> <td data-bbox="867 1152 1279 1184">Defrosting Fluid, per MIL-A-8243</td> </tr> <tr> <td data-bbox="591 1184 867 1247">F</td> <td data-bbox="867 1184 1279 1247">Cleaning Compound, per MIL-PRF-87937 type I alkaline base</td> </tr> <tr> <td data-bbox="591 1247 867 1278">G</td> <td data-bbox="867 1247 1279 1278">Gasoline, per ASTM-D-4814</td> </tr> <tr> <td data-bbox="591 1278 867 1310">H</td> <td data-bbox="867 1278 1279 1310">Gasohol, per A-A-52530</td> </tr> <tr> <td data-bbox="591 1310 867 1436">I</td> <td data-bbox="867 1310 1279 1436">One part Isopropyl Alcohol, per TT-I-735, grade A or B: and 3 parts Mineral Spirits, per A-A-2904, type II, grade A or P-D-680, type I, by volume</td> </tr> <tr> <td data-bbox="591 1436 867 1467">J</td> <td data-bbox="867 1436 1279 1467">Deleted</td> </tr> <tr> <td data-bbox="591 1467 867 1551">K</td> <td data-bbox="867 1467 1279 1551">Coolant dielectric fluid, synthetic silicate ester base MIL-PRF-47220 (Coolanol 25) or equivalent</td> </tr> <tr> <td data-bbox="591 1551 867 1583">L</td> <td data-bbox="867 1551 1279 1583">Deleted</td> </tr> <tr> <td data-bbox="591 1583 867 1638">Z</td> <td data-bbox="867 1583 1279 1638">As specified in the referencing document</td> </tr> </tbody> </table> | Test Condition | Fluid | A | Hydraulic Fluid, per MIL-H-5606 | B | Turbine Fluid, grade JP-8, per MIL-DTL-83133 (NATO Type 34) | C | Lubricating oil, per MIL-L-7808 | D | Lubricating Oil, per MIL-PRF-23699 | E | Defrosting Fluid, per MIL-A-8243 | F | Cleaning Compound, per MIL-PRF-87937 type I alkaline base | G | Gasoline, per ASTM-D-4814 | H | Gasohol, per A-A-52530 | I | One part Isopropyl Alcohol, per TT-I-735, grade A or B: and 3 parts Mineral Spirits, per A-A-2904, type II, grade A or P-D-680, type I, by volume | J | Deleted | K | Coolant dielectric fluid, synthetic silicate ester base MIL-PRF-47220 (Coolanol 25) or equivalent | L | Deleted | Z | As specified in the referencing document |
| Test Condition      | Fluid  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| A                   | Hydraulic Fluid, per MIL-H-5606  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| B                   | Turbine Fluid, grade JP-8, per MIL-DTL-83133 (NATO Type 34)  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| C                   | Lubricating oil, per MIL-L-7808  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| D                   | Lubricating Oil, per MIL-PRF-23699   |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| E                   | Defrosting Fluid, per MIL-A-8243   |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| F                   | Cleaning Compound, per MIL-PRF-87937 type I alkaline base  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| G                   | Gasoline, per ASTM-D-4814  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| H                   | Gasohol, per A-A-52530   |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| I                   | One part Isopropyl Alcohol, per TT-I-735, grade A or B: and 3 parts Mineral Spirits, per A-A-2904, type II, grade A or P-D-680, type I, by volume  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| J                   | Deleted  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| K                   | Coolant dielectric fluid, synthetic silicate ester base MIL-PRF-47220 (Coolanol 25) or equivalent  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| L                   | Deleted  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| Z                   | As specified in the referencing document   |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| High Impact Shock   | Mated connectors, wired with MIL-C-915/60 or /63 cable and equipped with straight environmentally sealed backshells, withstand high impact shock per MIL-S-901.  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |
| Vibration           | There shall be no electrical discontinuity and there shall be no disengagement of the mated connectors, backing off of the coupling mechanism, evidence of cracking, breaking, or loosening of parts.  |                |       |   |                                 |   |   |   |                                 |   |                                    |   |                                  |   |   |   |                           |   |                        |   |   |   |         |   |   |   |         |   |  |



# MIL-DTL-38999 Series III Performance Specifications

Scoop Proof, Triple Start, Self-Locking, Threaded Coupling Connector

| REQUIREMENT              | PERFORMANCE SPECIFICATIONS  |                 |                            |                 |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
|--------------------------|---|-----------------|----------------------------|-----------------|--|--|----------------|-----------------|----------------|-----------------|-----|----|-----|-----|---|-------|----|-----|-----|---|-------|----|-----|-----|---|-------|----|-----|-----|---|-------|----|-----|-----|---|-------|----|-----|-----|---|-------|----|-----|-----|---|-------|----|-----|-----|---|-------|----|-----|-----|---|
| Fungus                   | Materials used in the construction of these connectors shall be fungus inert per certification method 508.6 of MIL-STD-810.   |                 |                            |                 |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| Corrosion                | When tested in accordance with EIA-364-26, meets appropriate electrical and mechanical requirements and shows no exposure of base metal after 500 hours of salt spray.  |                 |                            |                 |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| Durability               | No electrical or mechanical defects after 500 cycles of engagement and disengagement.   |                 |                            |                 |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| Insert retention         | Unmating connectors shall retain their proper location in the shell and there shall be no evidence of cracking, breaking, separation from the shell, or loosening of parts.   |                 |                            |                 |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| Contact Retention        | The axial displacement of the contact shall not exceed .012 inch (0.30 mm). No damage to contacts or inserts shall result.  |                 |                            |                 |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| EMI Ground Spring Forces | <p>The forces necessary to engage and separate EMI plugs with receptacle shells shall be within the values specified in the table shown below:</p> <table border="1"> <thead> <tr> <th rowspan="2">Shell Size</th> <th colspan="4">Axial Force for Series III</th> </tr> <tr> <th>Maximum pounds</th> <th>Minimum Newtons</th> <th>Maximum pounds</th> <th>Minimum Newtons</th> </tr> </thead> <tbody> <tr> <td>8/9</td> <td>25</td> <td>111</td> <td>0.5</td> <td>2</td> </tr> <tr> <td>10/11</td> <td>25</td> <td>111</td> <td>0.5</td> <td>2</td> </tr> <tr> <td>12/13</td> <td>30</td> <td>133</td> <td>0.5</td> <td>2</td> </tr> <tr> <td>14/15</td> <td>30</td> <td>133</td> <td>0.5</td> <td>2</td> </tr> <tr> <td>16/17</td> <td>35</td> <td>156</td> <td>0.5</td> <td>2</td> </tr> <tr> <td>18/19</td> <td>35</td> <td>156</td> <td>0.5</td> <td>2</td> </tr> <tr> <td>20/21</td> <td>35</td> <td>156</td> <td>0.5</td> <td>2</td> </tr> <tr> <td>22/23</td> <td>35</td> <td>156</td> <td>0.5</td> <td>2</td> </tr> <tr> <td>24/25</td> <td>35</td> <td>156</td> <td>0.5</td> <td>2</td> </tr> </tbody> </table> | Shell Size      | Axial Force for Series III |                 |  |  | Maximum pounds | Minimum Newtons | Maximum pounds | Minimum Newtons | 8/9 | 25 | 111 | 0.5 | 2 | 10/11 | 25 | 111 | 0.5 | 2 | 12/13 | 30 | 133 | 0.5 | 2 | 14/15 | 30 | 133 | 0.5 | 2 | 16/17 | 35 | 156 | 0.5 | 2 | 18/19 | 35 | 156 | 0.5 | 2 | 20/21 | 35 | 156 | 0.5 | 2 | 22/23 | 35 | 156 | 0.5 | 2 | 24/25 | 35 | 156 | 0.5 | 2 |
| Shell Size               | Axial Force for Series III  |                 |                            |                 |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
|                          | Maximum pounds  | Minimum Newtons | Maximum pounds             | Minimum Newtons |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| 8/9                      | 25  | 111             | 0.5                        | 2               |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| 10/11                    | 25  | 111             | 0.5                        | 2               |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| 12/13                    | 30  | 133             | 0.5                        | 2               |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| 14/15                    | 30  | 133             | 0.5                        | 2               |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| 16/17                    | 35  | 156             | 0.5                        | 2               |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| 18/19                    | 35  | 156             | 0.5                        | 2               |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| 20/21                    | 35  | 156             | 0.5                        | 2               |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| 22/23                    | 35  | 156             | 0.5                        | 2               |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |
| 24/25                    | 35  | 156             | 0.5                        | 2               |  |  |                |                 |                |                 |     |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |       |    |     |     |   |



# MIL-DTL-38999 Series III Contact Specifications

AS39029 Crimp and Hermetic Pin and Socket Contacts

| REQUIREMENT                | PERFORMANCE SPECIFICATIONS |              |                        |              |                        |       |
|----------------------------|----------------------------|--------------|------------------------|--------------|------------------------|-------|
| Current Rating             | Contact Size               |              | Maximum Amps           |              |                        |       |
|                            |                            |              | Crimp                  | Hermetic     |                        |       |
|                            | 22D                        |              | 5                      | 3            |                        |       |
|                            | 20                         |              | 7.5                    | 5            |                        |       |
|                            | 16                         |              | 13                     | 10           |                        |       |
|                            | 12                         |              | 23                     | 17           |                        |       |
|                            | 10                         |              | 33                     | 24           |                        |       |
| Contact millivolt Drop     | Contact Size               |              | Maximum Millivolt Drop |              |                        |       |
|                            |                            |              | Crimp                  | Hermetic     |                        |       |
|                            | 22D                        |              | 73                     | 85           |                        |       |
|                            | 20                         |              | 55                     | 60           |                        |       |
|                            | 16                         |              | 49                     | 85           |                        |       |
|                            | 12                         |              | 42                     | 82           |                        |       |
|                            | 10                         |              | 33                     | 72           |                        |       |
| Contact Resistance at 25°C | Class                      | Contact Size | Wire Size              | Test Amperes | Millivolt Drop Maximum |       |
|                            | H, N and Y                 | 12           | 12                     | 17           | Initial                | After |
|                            |                            | 16           | 16                     | 10           | 85                     | 100   |
|                            |                            | 20           | 20                     | 5            | 60                     | 75    |
|                            |                            | 22D          | 22                     | 3            | 85                     | 95    |

## MIL-DTL-38999 CONTACT MATERIALS AND SPECIFICATIONS

| Component             | Material  | Notes                     |
|-----------------------|---|---------------------------|
| Pin Contact           | Copper alloy, 50 micro inches gold plated per ASTM B488 Type 3 Code C Class 1,27 over nickel plate per SAE AMS-QQ-N-290.  | Approved for Space Flight |
| Pin Contact, Hermetic | Nickel-iron alloy per ASTM F30 9(Alloy 52), 50 micro inches gold plated per ASTM B488 Type 3 Code C Class 1,27 over nickel plate per SAE-AMS-QQ-N-290 Class 2, 50-100 micro inches. | Ferromagnetic Material    |
| Socket Contact        | Copper alloy, 50 micro inches gold plated per ASTM B488 Type 3 Code C Class 1,27 over nickel plate per SAE AMS-QQ-N-290.  | Approved for Space Flight |
| Socket Contact Hood   | Stainless Steel, passivated per AMS2700.  | Approved for Space Flight |

# MIL-DTL-38999 Series I, II, III, and IV Connectors Insert Arrangements (IAW MIL-STD-1560)

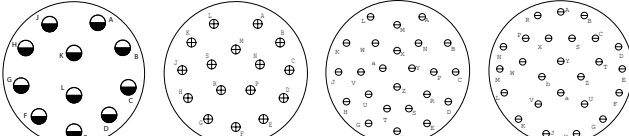
|            |      |      |      |      |      |       |       |       |
|------------|------|------|------|------|------|-------|-------|-------|
|            |      |      |      |      |      |       |       |       |
| Series I   | 9-35 | 9-98 | 11-2 | 11-4 | 11-5 | 11-35 | 11-98 | 11-99 |
| Series II  | 8-35 | 8-98 | 10-2 | 10-4 | 10-5 | 10-35 | 10-98 | 10-99 |
| Series III | A35  | A98  | B2   | B4   | B5   | B35   | B98   | B99   |
| Series IV  | ---  | ---  | ---  | ---  | B5   | B35   | B98   | B99   |

|            |      |      |       |       |
|------------|------|------|-------|-------|
|            |      |      |       |       |
| Series I   | 13-4 | 13-8 | 13-35 | 13-98 |
| Series II  | 12-4 | 12-8 | 12-35 | 12-98 |
| Series III | C4   | C8   | C35   | C98   |
| Series IV  | C4   | ---  | C35   | C98   |

|            |      |       |       |       |       |       |
|------------|------|-------|-------|-------|-------|-------|
|            |      |       |       |       |       |       |
| Series I   | 15-5 | 15-15 | 15-18 | 15-19 | 15-35 | 15-97 |
| Series II  | 14-5 | 14-15 | 14-18 | 14-19 | 14-35 | 14-97 |
| Series III | D5   | D15   | D18   | D19   | D35   | D97   |
| Series IV  | D5   | ---   | D18   | D19   | D35   | D97   |

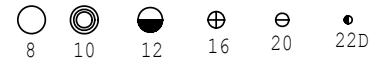
|            |      |      |      |       |       |       |       |
|------------|------|------|------|-------|-------|-------|-------|
|            |      |      |      |       |       |       |       |
| Series I   | 17-2 | 17-6 | 17-8 | 17-11 | 17-26 | 17-35 | 17-99 |
| Series II  | 16-2 | 16-6 | 16-8 | 16-11 | 16-26 | 16-35 | 16-99 |
| Series III | E2   | E6   | E8   | E11   | E26   | E35   | E99   |
| Series IV  | E2   | E6   | E8   | E11   | E26   | E35   | ---   |

|            |       |       |       |       |       |       |       |
|------------|-------|-------|-------|-------|-------|-------|-------|
|            |       |       |       |       |       |       |       |
| Series I   | 19-11 | 19-18 | 19-28 | 19-30 | 19-32 | 19-35 | 19-45 |
| Series II  | 18-11 | 18-18 | 18-28 | 18-30 | 18-32 | 18-35 | 18-45 |
| Series III | F11   | F18   | F28   | F30   | F32   | F35   | F45   |
| Series IV  | F11   | F18   | ---   | ---   | F32   | F35   | ---   |

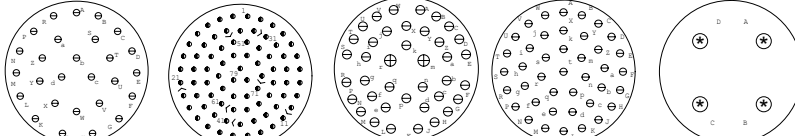


|                |          |          |          |          |
|----------------|----------|----------|----------|----------|
| Series I       | 21-11    | 21-16    | 21-24    | 21-25    |
| Series II      | 20-11    | 20-16    | 20-24    | 20-25    |
| Series III, IV | G11, G11 | G16, G16 | G24, G24 | G25, --- |

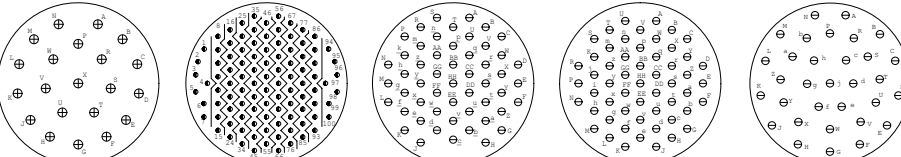
### Contact Size Key



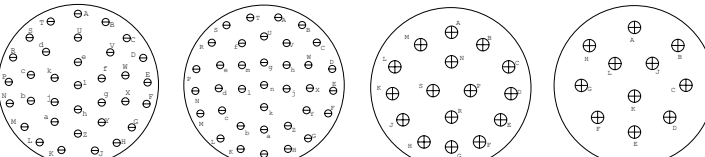
**\* Size 8 Contacts NOTE:** The SAE-AS39029/90 and 91 size 8 coaxial data bus contacts are not fully compatible with this insert arrangement and will require the use of a separate boot to seal properly and reduce the splaying of the contact.



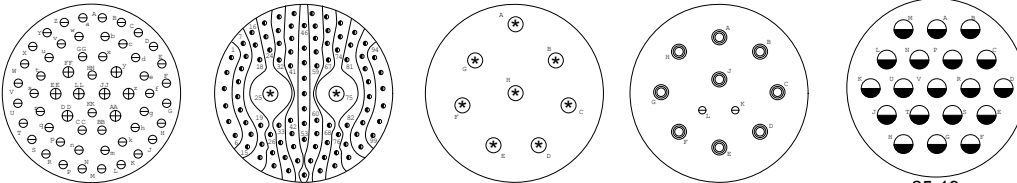
|                |          |          |          |          |          |
|----------------|----------|----------|----------|----------|----------|
| Series I       | 21-27    | 21-35    | 21-39    | 21-41    | 21-75    |
| Series II      | 20-27    | 20-35    | 20-39    | 20-41    | 20-75    |
| Series III, IV | G27, --- | G35, G35 | G39, --- | G41, G41 | G75, G75 |



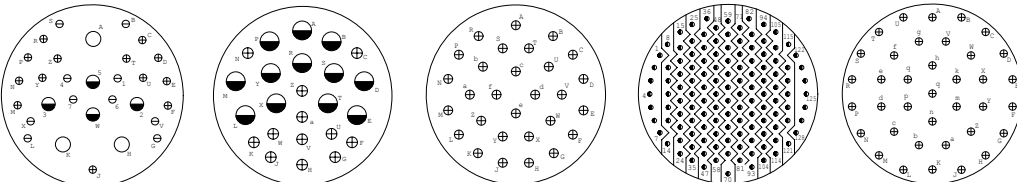
|                |          |          |          |          |          |
|----------------|----------|----------|----------|----------|----------|
| Series I       | 23-21    | 23-35    | 23-53    | 23-55    | 23-32    |
| Series II      | 22-21    | 22-35    | 22-53    | 22-55    | 22-32    |
| Series III, IV | H21, H21 | H35, H35 | H53, --- | H55, H55 | H32, --- |



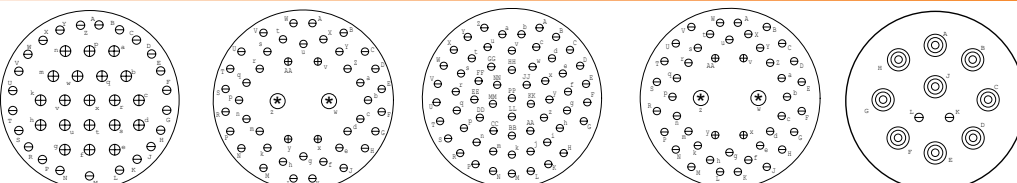
|                |          |          |          |          |
|----------------|----------|----------|----------|----------|
| Series I       | 23-34    | 23-36    | 23-97    | 23-99    |
| Series II      | 22-34    | 22-36    | 22-97    | 22-99    |
| Series III, IV | H34, --- | H36, --- | H97, --- | H99, --- |



|                |        |        |        |          |          |
|----------------|--------|--------|--------|----------|----------|
| Series I       | 25-4   | 25-7   | 25-8   | 25-11    | 25-19    |
| Series II      | 24-4   | 24-7   | 24-8   | 24-11    | 24-19    |
| Series III, IV | J4, J4 | J7, J7 | J8, J8 | J11, J11 | J19, J19 |



|                |          |          |          |          |          |
|----------------|----------|----------|----------|----------|----------|
| Series I       | 25-20    | 25-24    | 25-29    | 25-35    | 25-37    |
| Series II      | 24-20    | 24-24    | 24-29    | 24-35    | 24-37    |
| Series III, IV | J20, J20 | J24, J24 | J29, J29 | J35, J35 | J37, J37 |



|                |          |          |          |          |                  |
|----------------|----------|----------|----------|----------|------------------|
| Series I       | 25-43    | 25-46    | 25-61    | 25-90    | J-11             |
| Series II      | 24-43    | 24-46    | 24-61    | 24-90    | (Series IV Only) |
| Series III, IV | J43, J43 | J46, J46 | J61, J61 | J90, J90 |                  |



## MIL-DTL-38999 Series I, II, III, and IV Connectors Layouts and Pin Counts

| Shell Size and Insert Arrangements |           |            |                | Number of Pins |    |    |    |         |           |        |          |
|------------------------------------|-----------|------------|----------------|----------------|----|----|----|---------|-----------|--------|----------|
| Series I                           | Series II | Series III | Service Rating | 22D            | 20 | 16 | 12 | 12 coax | 12 twinax | 8 coax | 8 twinax |
| 9-35                               | 8-35      | A35        | M              | 6              |    |    |    |         |           |        |          |
| 9-98                               | 8-98      | A98        | I              |                | 3  |    |    |         |           |        |          |
| 11-2                               | 10-2      | B2         | I              |                |    | 2  |    |         |           |        |          |
| 11-4                               | 10-4      | B4         | I              |                | 4  |    |    |         |           |        |          |
| 11-5                               | 10-5      | B5         | I              |                | 5  |    |    |         |           |        |          |
| 11-35                              | 10-35     | B35        | M              | 13             |    |    |    |         |           |        |          |
| 11-98                              | 10-98     | B98        | I              |                | 6  |    |    |         |           |        |          |
| 11-99                              | 10-99     | B99        | I              |                | 7  |    |    |         |           |        |          |
| 13-4                               | 12-4      | C4         | I              |                |    | 4  |    |         |           |        |          |
| 13-8                               | 12-8      | C8         | I              |                | 8  |    |    |         |           |        |          |
| 13-35                              | 12-35     | C35        | M              | 22             |    |    |    |         |           |        |          |
| 13-98                              | 12-98     | C98        | I              |                | 10 |    |    |         |           |        |          |
| 15-5                               | 14-5      | D5         | II             |                |    | 5  |    |         |           |        |          |
| 15-15                              | 14-15     | D15        | I              |                | 14 | 1  |    |         |           |        |          |
| 15-18                              | 14-18     | D18        | I              |                | 18 |    |    |         |           |        |          |
| 15-19                              | 14-19     | D19        | I              |                | 19 |    |    |         |           |        |          |
| 15-35                              | 14-35     | D35        | M              | 37             |    |    |    |         |           |        |          |
| 15-97                              | 14-97     | D97        | I              |                | 8  | 4  |    |         |           |        |          |
| 17-2                               | 16-2      | E2         | M              | 38             |    |    |    |         |           |        | 1        |
| 17-6                               | 16-6      | E6         | I              |                |    |    | 6  |         |           |        |          |
| 17-8                               | 16-8      | E8         | II             |                |    | 8  |    |         |           |        |          |
| 17-11                              | 16-11     | E11        | N              |                | 8  |    |    | 1       | 2         |        |          |
| 17-26                              | 16-26     | E26        | I              |                | 26 |    |    |         |           |        |          |
| 17-35                              | 16-35     | E35        | M              | 55             |    |    |    |         |           |        |          |
| 17-99                              | 16-99     | E99        | I              |                | 21 | 2  |    |         |           |        |          |
| 19-11                              | 18-11     | F11        | II             |                |    | 11 |    |         |           |        |          |
| 19-18                              | 18-18     | F18        | M              | 14             |    |    |    |         |           |        | 4        |
| 19-28                              | 18-28     | F28        | I              |                | 26 | 2  |    |         |           |        |          |
| 19-30                              | 18-30     | F30        | I              |                | 29 | 1  |    |         |           |        |          |
| 19-32                              | 18-32     | F32        | I              |                | 32 |    |    |         |           |        |          |
| 19-35                              | 18-35     | F35        | M              | 66             |    |    |    |         |           |        |          |
| 19-45                              | 18-45     | F45        | M              | 67             |    |    |    |         |           |        |          |
| 21-11                              | 20-11     | G11        | I              |                |    |    | 11 |         |           |        |          |
| 21-16                              | 20-16     | G16        | II             |                |    | 16 |    |         |           |        |          |
| 21-24                              | 20-24     | G24        | I              |                | 24 |    |    |         |           |        |          |
| 21-25                              | 20-25     | G25        | I              |                | 25 |    |    |         |           |        |          |
| 21-27                              | 20-27     | G27        | I              |                | 27 |    |    |         |           |        |          |
| 21-35                              | 20-35     | G35        | M              | 79             |    |    |    |         |           |        |          |
| 21-39                              | 20-39     | G39        | I              |                | 37 | 2  |    |         |           |        |          |
| 21-41                              | 20-41     | G41        | I              |                | 41 |    |    |         |           |        |          |

| Shell Size and Insert Arrangements |           |            |                | Number of Pins |    |    |    |         |           |        |          |
|------------------------------------|-----------|------------|----------------|----------------|----|----|----|---------|-----------|--------|----------|
| Series I                           | Series II | Series III | Service Rating | 22D            | 20 | 16 | 12 | 12 coax | 12 twinax | 8 coax | 8 twinax |
| 21-75                              | 20-75     | G75        | M              |                |    |    |    |         |           |        | 4        |
| 23-21                              | 22-21     | H21        | II             |                |    |    | 21 |         |           |        |          |
| 23-32                              | 22-32     | H32        | I              |                | 32 |    |    |         |           |        |          |
| 23-34                              | 22-34     | H34        | I              |                | 34 |    |    |         |           |        |          |
| 23-35                              | 22-35     | H35        | M              | 100            |    |    |    |         |           |        |          |
| 23-36                              | 22-36     | H36        | I              |                | 36 |    |    |         |           |        |          |
| 23-53                              | 22-53     | H53        | I              |                | 53 |    |    |         |           |        |          |
| 23-55                              | 22-55     | H55        | I              |                | 55 |    |    |         |           |        |          |
| 23-97                              | 22-97     | H97        | I              |                |    |    | 16 |         |           |        |          |
| 23-99                              | 22-99     | H99        | II             |                |    |    | 11 |         |           |        |          |
| 25-4                               | 24-4      | J4         | I              |                | 48 | 8  |    |         |           |        |          |
| 25-7                               | 24-7      | J7         | M              | 97             |    |    |    |         |           |        | 2        |
| 25-8                               | 24-8      | J8         | M              |                |    |    |    |         |           |        | 8        |
| 25-11                              | 24-11     | J11        | N              |                |    |    | 2  | 9       |           |        |          |
| 25-19                              | 24-19     | J19        | I              |                |    |    | 19 |         |           |        |          |
| 25-24                              | 24-24     | J24        | I              |                |    | 12 | 12 |         |           |        |          |
| 25-29                              | 24-29     | J29        | I              |                |    | 29 |    |         |           |        |          |
| 25-35                              | 24-35     | J35        | M              | 128            |    |    |    |         |           |        |          |
| 25-43                              | 24-43     | J43        | I              |                | 23 | 20 |    |         |           |        |          |
| 25-46                              | 24-46     | J46        | I              |                | 40 | 4  |    |         |           | 2      |          |
| 25-61                              | 24-61     | J61        | I              |                | 61 |    |    |         |           |        |          |
| 25-90                              | 24-90     | J90        | I              |                | 40 | 4  |    |         |           |        | 2        |

| Shell Size / Insert Arrangements | Number of Pins |     |    |    |    |    |
|----------------------------------|----------------|-----|----|----|----|----|
|                                  | Series IV      | 22D | 20 | 16 | 12 | 10 |
| B5                               |                |     | 5  |    |    |    |
| B35                              |                | 13  |    |    |    |    |
| B98                              |                |     | 6  |    |    |    |
| B99                              |                |     | 7  |    |    |    |
| C4                               |                |     |    | 4  |    |    |
| C35                              |                | 22  |    |    |    |    |
| C98                              |                |     | 10 |    |    |    |
| D5                               |                |     |    | 5  |    |    |
| D18                              |                |     | 18 |    |    |    |
| D19                              |                | 37  | 19 |    |    |    |
| D35                              |                |     |    |    |    |    |
| D97                              |                |     | 8  | 4  |    |    |
| E6                               |                |     |    |    | 6  |    |
| E8                               |                |     |    | 8  |    |    |
| E26                              |                |     | 26 |    |    |    |
| E35                              |                | 55  |    |    |    |    |
| F11                              |                |     |    | 11 |    |    |

| Shell Size / Insert Arrangements | Number of Pins |     |    |    |    |    |
|----------------------------------|----------------|-----|----|----|----|----|
|                                  | Series IV      | 22D | 20 | 16 | 12 | 10 |
| G41                              |                |     | 41 |    |    |    |
| H21                              |                |     |    | 21 |    |    |
| H35                              |                | 100 |    |    |    |    |
| H55                              |                |     | 55 |    |    |    |
| J4                               |                |     | 48 | 8  |    |    |
| J11                              |                |     | 2  |    |    | 9  |
| J19                              |                |     |    |    | 19 |    |
| J24                              |                |     |    | 12 | 12 |    |
| J29                              |                |     |    | 29 |    |    |
| J35                              |                | 128 |    |    |    |    |
| J43                              |                |     | 23 | 20 |    |    |
| J61                              |                |     | 61 |    |    |    |
| F32                              |                |     | 32 |    |    |    |
| F35                              |                | 66  |    |    |    |    |
| G11                              |                |     |    |    | 11 |    |
| G16                              |                |     |    | 16 |    |    |
| G35                              |                | 79  |    |    |    |    |

## Every Day is a Winding Road

We sometimes joke that our industry moves at a glacial pace—especially considering how old some of the Mil-Spec products are that still get spec'd in on new interconnect designs. But despite the many "static" markers revealing how slow and steady our industry can be, there are far more indicators that we exist in a "dynamic" business environment. The concept of dynamic versus static is an interesting one to explore. For example, we have braiding rigs on our factory floor that so exactly accomplish the work they were designed for that the equipment has seen little or no change in over 50 years. On the other hand we have new and advanced CNC machining centers and robotic assembly equipment that has dynamically improved the productivity and safety of our factory. The opportunity is always there for improvement. It just takes an appetite for innovation and change—a willingness to embrace the dynamic nature of the world—to move the operation forward.

A good historical example of resistance to change can be found in the rail industry, where the introduction of the automatic air brake made freight train operation safer and more efficient. Formerly, railway brakemen would move rapidly from car to car manually turning hand brakes—big wheels mounted high up on the sides of each rail car—to slow the train during a long descent. Automatic air brakes made this operation much safer and far more reliable—both for workers and the public. And yet years after air brakes had become a required standard on all freight trains, brakemen were still required by work rules and contracts to be present on every train—even though they no longer had a useful role to play in the operation of the train.

I suspect there are countless examples of this type, where business managers, government regulators, standards bodies and others have been more inclined to hold to a set of static rules than to interact with the world in a more dynamic fashion. But just imagine if everybody did this! If a ball club manager never adjusted his starting lineup, if a product manager never looked for ways to make existing solutions better, if an engineer never embraced technologies that improved the performance and reliability of an important system.

At Glenair we believe it is far better to go through life adhering to a set of core principles—all the while being open to adjustments and change—than it is to lay down rigid rules or "recipes" for how every circumstance in our business should be managed. *Every Day is a Winding Road*, or so goes the song. To me this means every day is guaranteed to be full of twists and turns, and that we are at our best when we remain as flexible and as open to new ways of doing things as we can in our ongoing pursuit of excellence and sustainability in every market we serve.

*Chris Toomey*  
Christopher J. Toomey

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